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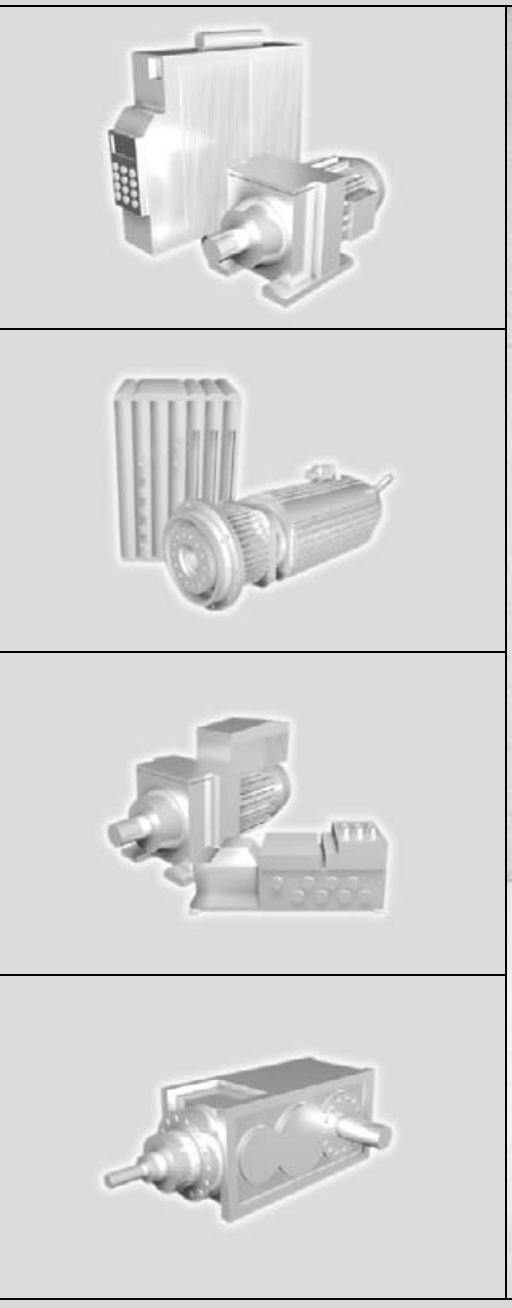

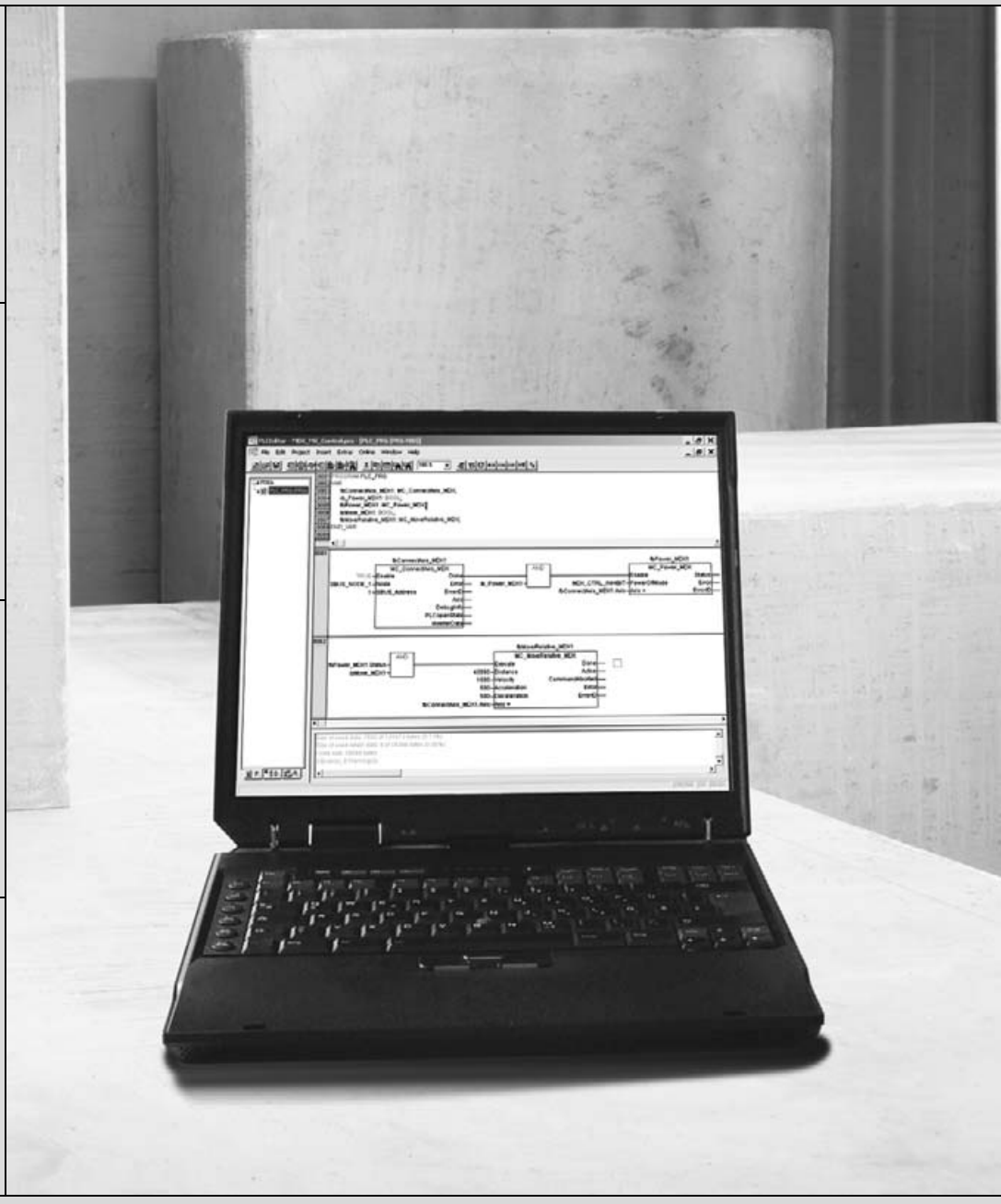

MPLCMotion_MC07 and MPLCMotion_MM Libraries for MOVI-PLC®

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Manual

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1 Important Notes

- **This manual does not replace the detailed operating instructions!**
- **Installation and startup of MOVI-PLC® controller and drives controlled by the unit through qualified personnel only observing all applicable accident prevention guidelines, the MOVI-PLC® controller manual as well as the MOVIMOT®, MOVIFIT® MC, MOVIFIT® SC, MOVIFIT® FC, MOVITRAC® 07 and MOVITRAC® B operating instructions!**

Documentation

- Read through this manual carefully before you start to install and startup frequency inverters controlled by the MOVI-PLC®controller.
- This manual assumes that operators are familiar with the documentation on MOVIMOT®, MOVIFIT® (depending on the respective MOVIFIT® version used), MOVITRAC® 07 and MOVITRAC® B.
- In this manual, cross references are marked with "→". For example, (→ Sec. X.X) means: You will find additional information in section X.X of this manual.
- As a prerequisite to fault-free operation and fulfillment of warranty claims, you must adhere to the information in the documentation.

Bus systems

General safety notes for bus systems:

You are now in possession of a communication system that lets you adapt MOVIMOT®, MOVIFIT® FC and MOVITRAC® frequency inverters to the particulars of your specific system. As with all bus systems, there is a danger of invisible, external (as far as the inverter is concerned) modifications to the parameters which give rise to changes in the inverter behavior. This may result in unexpected (not uncontrolled) system behavior.

Safety and warning instructions

Always observe the safety and warning instructions in this publication.

Electrical hazard
Possible consequences: Severe or fatal injuries.

Hazard
Possible consequences: Severe or fatal injuries.

Hazardous situation
Possible consequences: Slight or minor injuries.

Harmful situation
Possible consequences: Damage to the unit and the environment.

Tips and useful information.

2 Introduction

Content of the manual

This user manual describes the function blocks of the MPLCMotion_MC07 and MPLCMotion_MM libraries and their application.

Description

MOVI-PLC® is a programmable logic controller designed in accordance with IEC 61131-3.

Instances of the MOVI-PLC® controller include:

- MOVI-PLC® *basic* DHP11B control
- MOVIFIT® MC Technology function level with integrated MOVI-PLC® *basic*
- MOVI-PLC® *advanced* controller DH..41B

You can use the MOVI-PLC® controller, for example, as the control unit of a machine module. In this way, MOVI-PLC® controls all the drives within the machine module and in doing so takes off load from the master controller (e.g. machine or system PLC). In conjunction with a DOP operator terminal, MOVI-PLC® can also be used as a controller for entire machines.

The MPLCMotion_MC07 and MPLCMotion_MM libraries described in this manual for the MOVI-PLC® controller make for simple and central programming of the axis motions of the connected

- MOVITRAC® 07 drives
- MOVITRAC® B drives
- MOVIFIT® FC drives
- MOVIMOT® drive (as of version MOVIMOT® MM..C)

- Information for addressing MOVIFIT® SC with integrated motor control switch is listed in the section "Control with MOVIFIT® SC" page 77.
- Control of MOVIDRIVE® MDX60B/61B drive inverters and MOVIAXIS® MX multi-axis servo drives is described in the "MPLCMotion_MDX and MPLCMotion_MX libraries for MOVI-PLC®" manual.

Functions

The MPLCMotion_MC07 and MPLCMotion_MM libraries provide the following functions for all connected MOVIMOT®, MOVITRAC® or MOVIFIT® FC drives:

- Administrative functions
- Inverter operation (speed specification)
- Acceleration setpoint
- etc.

These functions are carried out decentrally in the frequency inverters. The MPLCMotion_MC07 and MPLCMotion_MM libraries ensure fast communication with the frequency inverters. It allows the motor axis movements to be programmed simply and centrally in the MOVI-PLC® controller.

Additional documentation

For simple and effective use of the MPLCMotion_MC07 and MPLCMotion_MM libraries, you should also order the following documentation in addition to this manual:

- "MOVI-PLC® programming in the PLC Editor" system manual
- "MOVI-PLC® basic DHP11B.. controller" manual
- "MOVITRAC® 07" system manual
- "MOVITRAC® B" system manual
- "MOVIMOT® MM..C" operating instructions
- "MOVIFIT® MC" operating instructions
- "MOVIFIT® SC" operating instructions
- "MOVIFIT® FC" operating instructions
- "MOVIFIT® Technology function level" manual

You must follow the instructions and safety notes published in these manuals when working with the drive system.

2.1 Application areas

The MPLCMotion_MC07 and MPLCMotion_MM libraries are suitable for all application areas in which the MOVI-PLC® controller controls one or more frequency inverters centrally.

Application example

Examples for typical applications of MPLCMotion_MC07 and MPLCMotion_MM libraries are:

- Conveyor belts
- Roller conveyers
- Proportioning
- Pump
- Fans
- etc.

Properties

The MPLCMotion_MC07 and MPLCMotion_MM libraries have the following characteristics:

- The MOVI-PLC® controller can control up to twelve MOVITRAC® drives with the help of the MPLCMotion_MC07 library and up to three MOVIMOT® drives with the help of the MPLCMotion_MM library.
- Users do not have to work with communication interfaces. Instead, they can operate the MOVI-PLC® controller using only motion and administration commands. This means that users do not have to be familiar with system bus communication and only require basic knowledge of the parameter settings of the frequency inverter (e.g. for startup or setting the system bus address).
- The system bus provides fast communication between MOVI-PLC® controller and the frequency inverters.
- The MPLCMotion_MM and MPLCMotion_MC07 libraries offers a large number of function blocks. Users can program their own applications in a flexible and fast manner.
- PLCopen-compliant commands allow users to familiarize themselves with the program quickly and easily.

2.2 Overview of the MPLCMotion_MC07 and MPLCMotion_MM libraries

Necessary libraries

Integrate the MPLCMotion_MC07 and MPLCMotion_MM libraries in the library manager of the PLC Editor in the MOVITOOLS® MotionStudio software (→ Sec. "Programming examples").

The following libraries are automatically linked in the library manager in this step and when setting the target system (→ Sec. "Programming examples"). They are necessary for executing the modules of the MPLCMotion_MC07/ MPLCMotion_MM library.

- MPLCDatatypes
- MPLCInterface_CAN
- MPLCInterface_CAN
- MPLCInterface_MoviLink
- MPLCSystem_ErrorCodes
- MPLCSystem_"MOVI-PLC-TYP"

  (e.g. MPLCSystem_DHP11B, according to target system setting)

The MPLCMotion_MC07 library contains the following function blocks, which are divided into several directories according to their functions:

MC07_Main

Directory MC07_Main:

– MC_ConnectAxis_MC07
– MC_Reset_MC07

MC07_SingleAxis Sensorless

Directory MC07_SingleAxisSensorless:

– MC_AxisStopSensorless_MC07
– MC_MoveVelocitySensorless_MC07
– MC_StopSensorless_MC07

MC07_SingleAxis SEW

Directory MC07_SingleAxisSEW:

– MC_MoveTargetSpeedSensorless_MC07

MC07_Inverter Parameters

Directory MC07_InverterParameters:

– MC_ReadParameter_MC07
– MC_SetDynamics_MC07
– MC_WriteParameter_MC07

The MPLCMotion_MM library contains the following function blocks, which are divided into several directories according to their functions:

MM_Main

Directory MM_Main:

– MC_ConnectAxis_MM
– MC_Reset_MM

MM_SingleAxis

Directory MM_SingleAxis:

– MC_MoveVelocitySensorless_MM
– MC_StopSensorless_MM

MM_Inverter Parameters

Directory MM_InverterParameters:

– MC_ReadParameter_MM
– MC_WriteParameter_MM
– MC_SetDynamics_MM
– MC_SetLimiter_MM

MM_Supplements

Directory MM_Supplements:

– MC_ReleaseBrake_MM

Note:

The MPLCMotion_MC07.lib and MPLCMotion_MM.lib libraries can be used simultaneously with all other libraries for the MOVI-PLC® controller.

However, fault-free operation can only be ensured when you operate all frequency inverters, which are controlled using the function blocks of the MPLCMotion_MC07.lib and MPLCMotion_MM.lib libraries, on one or more system CAN buses on which no other CAN objects (e.g. I/O modules) are set up.

2.3 Overview additional libraries for MOVI-PLC® controller

In addition to the `MPLCMotion_MC07.lib` and `MPLCMotion_MM.lib` libraries, you can install a number of other libraries in the PLC Editor of the MOVITOOLS® MotionStudio software to optimize the control of the drive and frequency inverters provided by SEW as well as other periphery modules.

The following is an overview of the basic libraries available for controlling units that are connected to the MOVI-PLC® controller. In addition to these libraries, further application-specific libraries are available e.g. for handling, cams, synchronous operation, winder applications, etc. depending on the inverter type.

MPLCProcessdata	**MPLCMotion_MDX**	**MPLCMotion_MC07**	**MPLCMotion_MX**	**MPLCMotion_MM**	**MPLCUtilities**
MOVI-PLC® can be used as a conventional controller • Controls all SEW inverters via process data • Uses process data profiles, application modules or your own IPOS® programs	MOVI-PLC® as motion controller for MOVIDRIVE® B • Single-axis motion commands • Uses MOVIDRIVE® B interfaces	MOVI-PLC® as motion controller for MOVITRAC® 07, MOVITRAC® B and MOVIFIT® FC • Speed commands • Use of MOVITRAC® 07, MOVITRAC® B and MOVIFIT® FC interfaces	MOVI-PLC® as motion controller for MOVIAXIS® • Single-axis motion commands • Uses MOVIAXIS® interfaces	MOVI-PLC® as motion controller for MOVIMOT® • Speed commands • Uses MOVIMOT® interfaces	To connect e.g. CANopen IO modules
↓	↓	↓	↓	↓	↓
SEW process data modules	MOVIDRIVE® MDX	MOVITRAC® 07 MOVITRAC® B MOVIFIT® FC interfaces	MOVIAXIS®	MOVIMOT®	CANopen IO modules
Elements that have to be installed in the control configuration of the PLC Editor to be able to use the libraries					

Overview of the inverter/unit-specific motion libraries and input/output libraries

3 Project Planning and Startup

This section describes the prerequisites for using the `MPLCMotion_MC07.lib` and `MPLCMotion_MM.lib` libraries and contains important information for project planning and startup.

3.1 Prerequisites

PC and software

An engineering PC and the MOVITOOLS® Motion Studio software are both required to program the MOVI-PLC® controller using the `MPLCMotion_MC07.lib` and `MPLCMotion_MM.lib` libraries. For additional information concerning PC and software requirements, see the "MOVI-PLC® Programming in PLC Editor" system manual.

MOVI-PLC®

The firmware version of the MOVI-PLC® and the version of the Motion library have to match. You can display both versions with the "Information & Remote Control" tool (open via context menu of "MOVI-PLC" in MOVITOOLS® MotionStudio software). Use the "Version management" tool to open the respective firmware and Motion libraries (open using the context menu of the "MOVI-PLC" in the MOVITOOLS® MotionStudio software).

For fault-free operation, all function blocks of the `MPLCMotion_MC07.lib` and `MPLCMotion_MM.lib` libraries have to be executed in the same task of the MOVI-PLC® (→ "MOVI-PLC® Programming in PLC Editor" system manual).

MOVIDRIVE® B

If the MOVI-PLC® controller is installed in MOVIDRIVE® MDX61B, the firmware version of the MOVIDRIVE® MDX61B must be at least 824 854 0.16, even if this MOVIDRIVE® MDX61B is not controlled by the MOVI-PLC® controller.

Control topology

You can connect up to 64 of the following inverters to the MOVI-PLC® controller via the system CAN buses (with MOVI-PLC® *basic* up to 12):

- MOVIDRIVE® MDX60B/61B
- MOVIAXIS®
- MOVITRAC® 07 / B
- MOVIMOT® (CANopen MFO... fieldbus interface required)
- Inveters controlled via the MPLCProcessdata library

  (e.g. MOVIDRIVE® A)

You can connect up to one MOVIMOT® frequency inverter to the COM interfaces of the MOVI-PLC® controller.

Note the following prerequisites for MOVI-PLC® *basic* DHP11B:

- Connect a maximum of six inverters to one system CAN bus.
  - When connecting between one and three drive inverters to one system CAN bus: Set the baud rate of the system CAN bus to ≥ 500 kBit/s.
  - When connecting between four and six inverters to one system CAN bus: Set the baud rate of the system CAN bus to ≥ 1000 kBit/s (if transmission rate is required).
- The MOVI-PLC® *basic* DHP11B controller comes equipped with an integrated COM interface COM1 and a second COM interface, COM2, can be added with the OST11B option card.

  You can connect one of the following devices to the COM 1 interface:
  - Engineering PC (X34 connector)
  - DOP11A operator terminal (X34 connector)

  You can connect one of the following devices to the COM 2 interface:
  - Engineering PC (preferably at X35 connector)
  - DOP11A operator terminal (preferably at X35 connector)
  - Gearmotor with integrated MOVIMOT® frequency inverter (at X36 connector only)
- Communication between MOVI-PLC® controller and MOVIMOT® drives takes place via serial interface at a baud rate of 9.6 kBaud.
- The MOVI-PLC® controller in technology version of the MOVIFIT® MC comes equipped with three integrated COM interfaces. The MOVIMOT® inverters addressed by the MOVIFIT® MC are connected to the three COM interfaces of the MOVIFIT® MC. All MOVIFIT® units come equipped with an additional COM interface (X50) for diagnostics and engineering.

Important:

The technical characteristics given in this section only apply when no other CAN bus stations are active on the system CAN bus used to control the frequency inverters.

Do not connect any other CAN bus stations to the system CAN bus on which frequency inverters controlled by the `MPLCMotion_MC07.lib` library are connected!

3.2 Communication times

Data transmission between MOVI-PLC® controller and MOVITRAC® 07, MOVITRAC® B or MOVIFIT® FC frequency inverters usually takes place at intervals of **5 ms**.

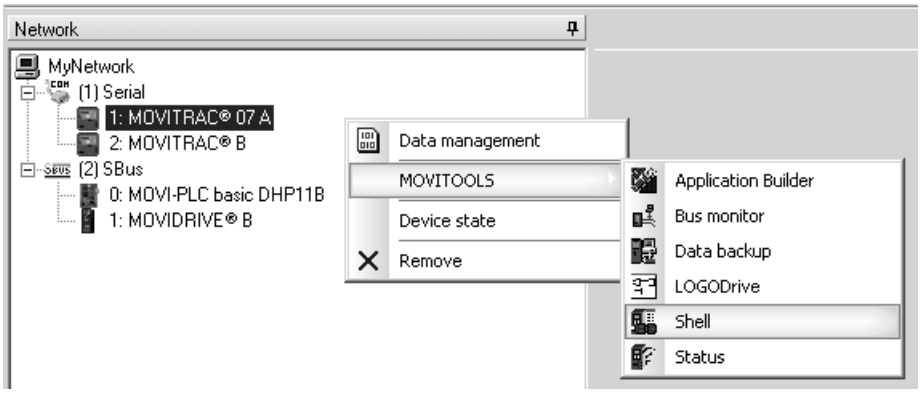
Data transmission between MOVI-PLC® controller and MOVIMOT® frequency inverter usually takes place at intervals of **30 ms**.

3.3 Startup

This section describes the startup process for the frequency inverter when it is to be controlled by the MOVI-PLC® controller.

MOVITRAC® 07 Startup

Note at startup of the MOVITRAC® 07 frequency inverter the instructions listed in the "MOVITRAC® 07" operating instructions.



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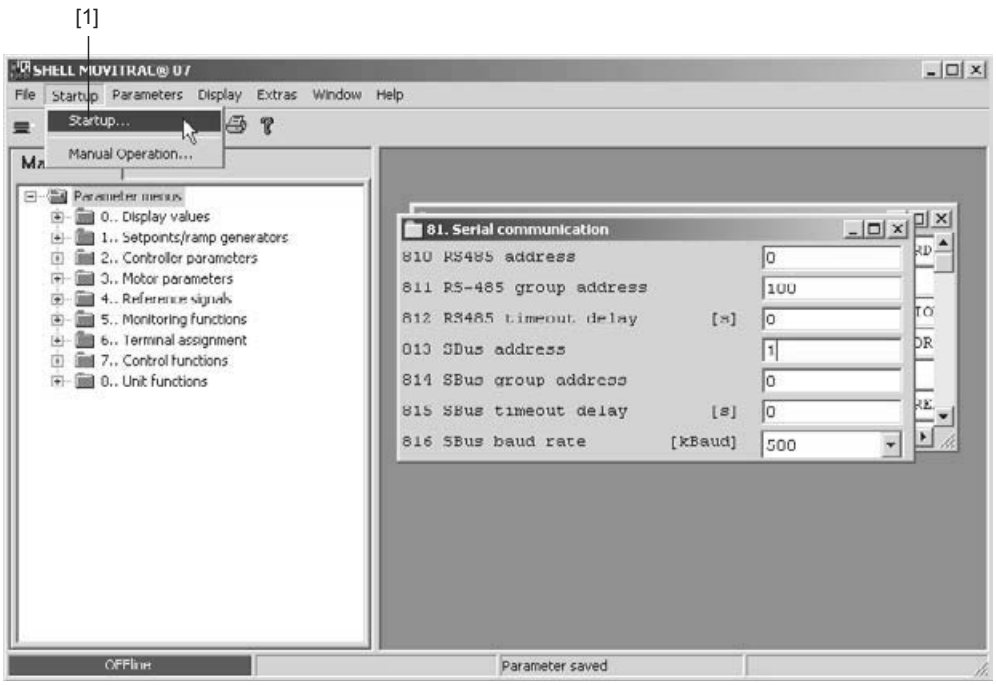
Access to the startup dialog of the MOVITOOLS® MotionStudio software takes place in the device tree via:

[MyNetwork] / [Serial] / [MOVITRAC® 07A] / [MOVITOOLS] / [Shell]



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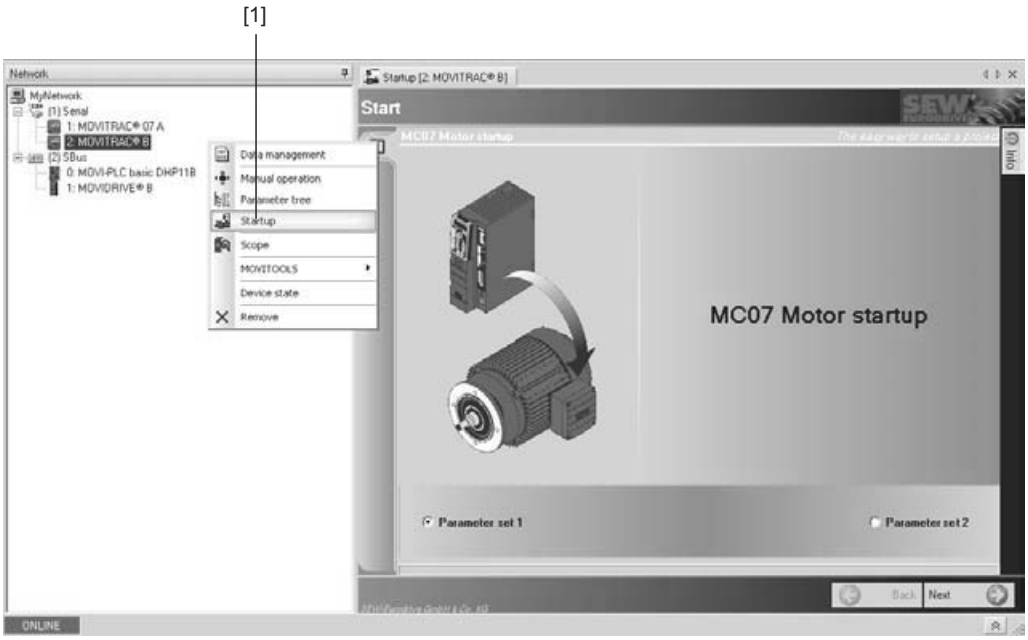
Open the [Startup] [1] dialog.

Set the parameter P813 to the CAN bus address of the connected MOVITRAC® 07 frequency inverter (permitted setting range 1...63).

Set parameter P816. The system bus baud rate depends on the number of connected inverters (→ Section "Control topology", page 10).

MOVITRAC® B Startup

Note at startup of the MOVITRAC® B frequency inverter the instructions listed in the "MOVITRAC® B basic model" operating instructions.



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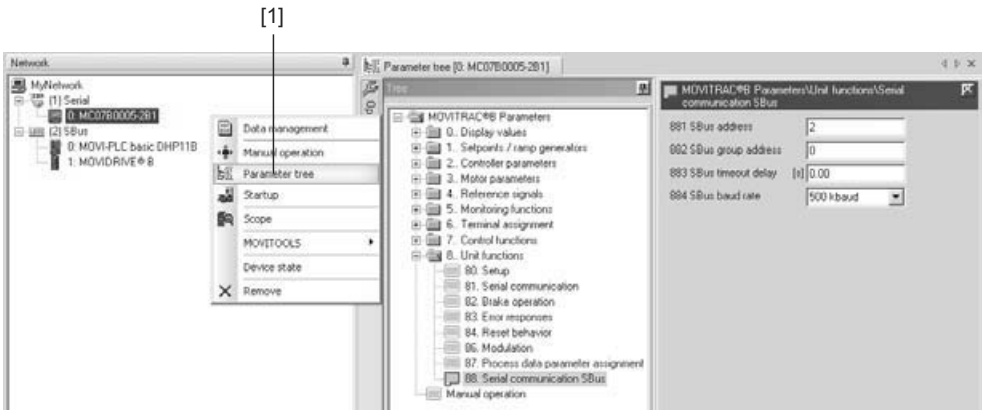
Access to the startup menu of the MOVITOOLS® MotionStudio software takes place in the device tree via:

[MyNetwork] / [Serial] / [MOVITRAC® B] / [Startup] [1]



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Open the [Parameter tree] [1] menu.

Set the parameter P881 to the CAN bus address of the connected MOVITRAC® B frequency inverter (permitted setting range 1...63).

Set parameter P884. The system bus baud rate depends on the number of connected inverters (→ Section "Control topology", page 10).

Startup MOVIMOT®

At startup of the MOVIMOT® inverter, note the instructions listed in the "MOVIMOT® MM..C" operating instructions.

Startup MOVIFIT® MC

At startup of the MOVIFIT® MC, note the instructions listed in the "MOVIFIT® MC" operating instructions.

Startup MOVIFIT® FC

At startup of the MOVIFIT® FC, note the instructions listed in the "MOVIFIT® FC" operating instructions.

3.4 Units and value ranges

Units

The function blocks of the `MPLCMotion_MC07.lib` and `MPLCMotion_MM.lib` libraries use the following units for their input and output signals:

- Speed in revolutions / minute [1/min]
- Accelerations as ramp times in milliseconds to achieve a speed [ms] (for MOVIMOT®) changed by 1500 1/min
- Accelerations as ramp times in milliseconds to achieve a speed [ms] (for MOVITRAC® 07, MOVITRAC® B and MOVIFIT® FC) changed by 3000 1/min

Value ranges

The following maximum value ranges are permitted for the function blocks of the `MPLCMotion_MC07.lib` and `MPLCMotion_MM.lib` libraries:

- Speeds: -3000 ... 3000 [1/min] (for MOVIMOT®)
- Speeds: -5500 ... 5500 [1/min] (for MOVITRAC® 07, MOVITRAC® B and MOVIFIT® FC)
- Accelerations: 100 ... 2000000 [ms] (for MOVIMOT®)
- Accelerations: 0 ... 2000000 [ms] (for MOVITRAC® 07, MOVITRAC® B and MOVIFIT® FC)

If these values are outside these ranges, the function blocks will issue error messages (exception function block MC_MoveTargetSpeedSensorless_MC07).

However, the frequency inverter adjusts the travel tasks to these limit values automatically depending on the motor connected and the limit values set in the inverter parameters. These limit values can be lower than the maximum values that can be set in the function blockfunction blocks. In this case, the function blockfunction blocks do not issue error messages.

4 Description of the Function Blocks

This section describes the functions and the behavior of the function blocks in the `MPLCMotion_MC07.lib` and `MPLCMotion_MM.lib` libraries.

4.1 General functionality of the function blocks

This section describes the basic functionality of the inputs and output signals of the function blocks and other general features of the MOVI-PLC® controller and frequency inverters. For specific examples of the interaction and sequence of several function blocks, including time diagrams, refer to the section "Programming examples" (→ starting on page 61).

Input signal Enable

There are different methods to activate two types of function blocks:

- function blocks that are activated by the input signal *Enable*.
- function blocks that are activated by the input signal *Execute*.

Function blocks that are activated by the input signal *Enable* typically perform cyclical actions (e.g. MC ReleaseBrake MM).

- When the input signal *Enable* is set to *TRUE*,
  - the function block is active.
  - the function block recalculates the output signals in each cycle.
- When the input signal *Enable* is set to *FALSE*,
  - the function block does not recalculate the output signals.
  - all the output signals remain at the value that was last calculated. (Exception: *Done*, *Busy* and *Error* are reset to *FALSE*.)

Therefore, the function block must verify the value of the output signals by setting the output signal *Done* to *TRUE*.

The input signal *Enable* of the MC_ConnectAxis_MC07 and MC_ConnectAxis_MM function blocks deviates from the functionality described here. For details, refer to the description of these function blocks.

Input signal Execute

Function blocks that are activated by the input signal *Execute* typically perform a single action (e.g. MC StopSensorless MC07).

A positive edge change at the *Execute* input signal starts the action.

The output signals remain in effect until the input signal *Execute* is reset to *FALSE* (falling edge) or until the function block is cancelled. However, if the input signal *Execute* is reset to *FALSE* before the action is completed, the output signals remain in effect for at least one more control cycle after the action has been concluded.

If a rising edge occurs at the *Execute* input, the values of the input signals are adopted for the action. Changing the input signals during the action has no effect. Another rising edge signal is required at the *Execute* input signal to adopt the modified values.

The function block MC_ReleaseBrake_MM deviates from the functionality described here.

Output signal Done, InVelocity

If the action of the function block has been completed successfully, the function block will set the output signals *Done* or *InVelocity* to *TRUE*.

Some function modules will image the condition *Speed reached* (continuous motion orders) of the frequency inverter to the output signal *Done*. The function block will check this condition until a falling edge appears at the input signal *Execute* or the function block is cancelled.

As long as the input signal *Execute* is set to *TRUE*, the function block resets the output signal *Done* to *FALSE* when the condition *Speed reached* is no longer fulfilled. Accordingly, the output signal *Done* is set to *TRUE* when the condition is fulfilled again. Consequently, when the input signal *Execute* is set to *TRUE*, the output signal *Done* can change between *TRUE* and *FALSE* several times.

Output signal Active

The output signal *Active* only exists for function blocks that control a movement of the motor axis.

The function block sets the output signal *Active* to *TRUE* when the motor axis controlled by the function block turns to reach the target (target position or target speed).

The function block usually sets the output signal *Active* to *TRUE* shortly after a rising edge occurs at the input signal *Execute*.

If the motor axis is prevented from rotating due to the terminal assignment on the frequency inverter (e.g. *controller inhibit*), the function block is executed, but the output signal *Active* is reset to *FALSE*.

The function block sets the output signal *Active* to *TRUE*, when:

- the terminal assignment on the frequency inverter enables the motor axis to turn when the function block is executed
- and the motor axis moves until it reaches the target.

If one of the output signals *Done* or *InVelocity*, *Error* or *CommandAborted* is set to *TRUE*, the function block with reset the output signal *Active* to *FALSE*.

Output signal Busy

This output signal *Busy* only exists for function blocks that require several control cycles for execution and that do not control any movement of the motor axis.

The function block sets the output signal *Busy* to *TRUE* as long as the function block is executed.

If one of the output signals *Done* or *Error* is set to *TRUE*, the function block with reset the output signal *Busy* to *FALSE*.

Output signal Command-Aborted

The output signal *CommandAborted* only exists for function blocks that control a movement of the motor axis.

The function block sets the output signal *CommandAborted* to *TRUE*, when its execution is cancelled

- by another function block
- or by another instance of the same function block,

when both control the same motor axis.

The active function block will also be aborted in case of:

- 24V DC operation
- Inverter error
- Communication error

This means that the cancelled task of the function block is no longer executed afterwards.

When the function block that was cancelled sets the output signal *CommandAborted* to *TRUE*, it resets the output signals *Done* or *InVelocity* and *Active* to *FALSE*. The function block resets the output signal *CommandAborted* to *FALSE* by setting a falling edge at the input signal *Execute*.

The following function blocks can cancel motion function blocks:

- MC_AxisStopSensorless_MC07
- MC_StopSensorless_MC07 and MC_StopSensorless_MM
- MC_ConnectAxis_MC07 and MC_ConnectAxis_MM (when the MOVI-PLC® controller detects an inverter error, communication error or 24 V operation of the frequency inverter in this function block).
- MC_MoveVelocitySensorless_MC07 and MC_MoveVelocitySensorless_MM
- MC_MoveTargetSpeedSensorless_MC07

The function block resets the output signal *InVelocity* to *FALSE* in case it is cancelled, even if the preset velocity of the cancelled function block stays within the defined range.

Output signal Error

If an error occurs in the MOVI-PLC® controller during the execution of a function block, the function block sets the output signal *Error* to *TRUE*. In this case, the relevant error is displayed at the output signal *ErrorID*.

Errors in the frequency inverter do not cause the output signal *Error* to be set, but are detected in the MC_ConnectAxis_MC07 or MC_ConnectAxis_MM function block and cause the cancellation of the motion function block.

Behavior in case of Controller inhibit, No enable, CW/Stop or CCW/Stop

When one or more of the following conditions applies, the function block interrupts the active travel task (continuous motion) of the motor axis:

- *Controller inhibit* (not with MOVIMOT®)
- *No enable*
- *CW/Stop*
- *CCW/Stop*

The function block does not cancel the travel task and the preset velocity will stay the same.

In case the active travel task is interrupted, the function block will

- reset the output signal *Active* to *FALSE*
- the output signal *CommandAborted* not to *TRUE*

The interruption does not cause an error in the function block.

As soon as the above conditions no longer apply, the function block continues the interrupted travel task.

If the stated condition are present at the time a motion function block is started, the motion function block is interrupted from the very beginning. Its execution is started as soon as the interrupt conditions no longer exist.

If the action of a motion function block is aborted in interrupted state and no additional motion command is to be started immediately afterwards, one of the function blocks MC_AxisStopSensorless_MC07 or MC_StopSensorless_MC07/MM will have to be executed. This stop can be executed even if the axis is in "*Controller inhibit*" or "*No enable*" state.

The electric rotating field will be interrupted immediately when setting the "*Controller inhibit*." The motor brake will apply regardless if the braking function is activated in the drive parameters. The drive stops with mechanical braking action. Drives without motor brake are in idle and will coast to a stop or can be accelerated by external forces.

Activation of "*No enable,*" "CW/Stop" or "*CCW/Stop*" will initially result in electrical braking of the drive. Drives without encoder will exhibit a very small maximum torque at speeds below 15 1/min. Braking to standstill for axes without encoder and brake application is possible at very low counterforces only. If a motor brake is installed and the brake function is activated, the motor brake will apply during the braking process shortly before reaching the standstill. Drives without motor brake or deactivated braking function are in idle after electrical braking and can be accelerated by external forces.

The braking process will continue after the interruption,

- if a braking action is interrupted by one of the listed conditions through the MC_AxisStopSensorless_MC07 or MC_StopSensorless_MC07/MM function blocks
- and if the axis is not at standstill at the end of the interruption.

Note:

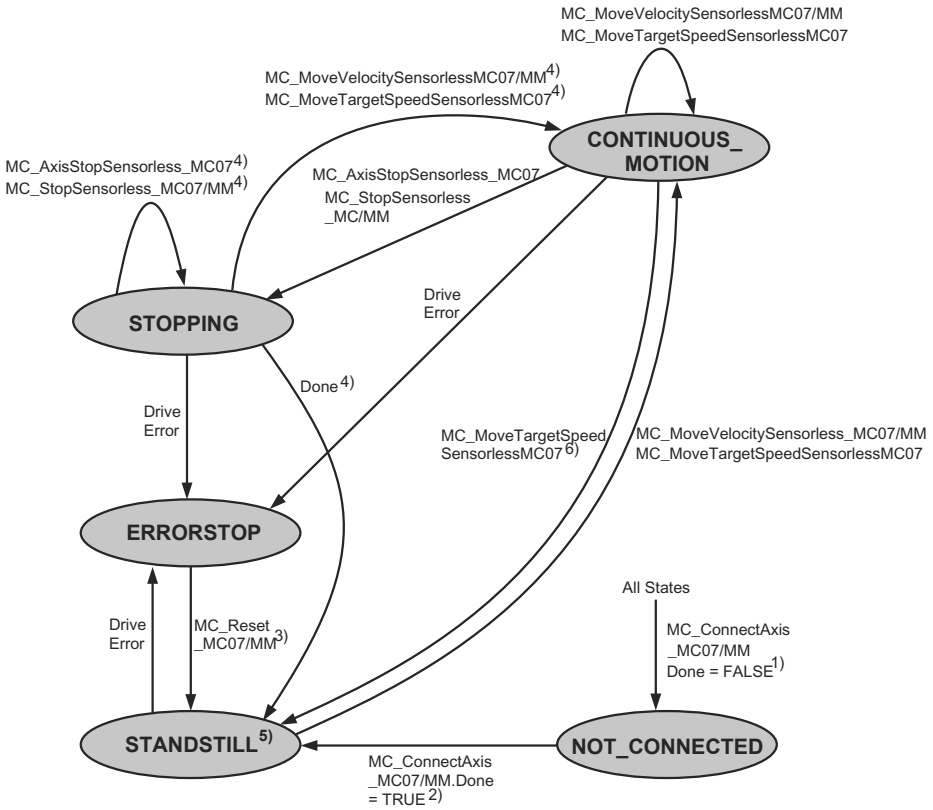
When a braking action, triggered by one of the function blocks MC_StopSensorless_MC07, MC_StopSensorless_MM is interrupted by a "*controller inhibit*," this braking action does not continue at the speed it had prior to the interruption once the interruption condition has been removed. The motor axis continues to decelerate during the interruption.

Response to 24V operation

When 24V operation is activated, the function block currently controlling the movement of the motor axis cancels the travel task. The function block sets the output signal *CommandAborted* to *TRUE*.

4.2 State diagram

In accordance with the execution of the function blocks in the MPLCMotion_MC07 and MPLCMotion_MM libraries, the MOVI-PLC® controller is always in a defined state. The current status will be indicated at the *PLCopenState* output signal of the MC_ConnectAxis_MC07/MM function block or the output signals of the MC_ReadStatus_MM function block. The following diagram shows which function blocks can be executed in the various states and the state transitions that they cause.



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1. MC_ConnectAxis_MC07.*Done*/MC_ConnectAxis_MM.*Done* = *FALSE* in case of a communication error between MOVI-PLC® controller and frequency inverter.
2. MC_ConnectAxis_MC07/MM must be called in each control cycle and, therefore, in each state.
3. MC_Reset_MC07/MC_Reset_MM can be called in any state, but has an effect in *ERRORSTOP* state only. During the Reset phase of the inverter/servo inverter, the state *NOT_CONNECTED* will be entered briefly. If a stop module is active during the reset phase (input signal *Execute* = *TRUE*), the MOVI-PLC will change to *STOPPING* state.
4. Prerequisite: The input signal *Execute* of the stop module that is currently active must be set to = *FALSE*.

5. The *STANDSTILL* state will be entered once the minimum speed drops below (15 1/min) or when the target position window is reached. An acceleration caused by external forces does not have to resulte in a change of the *PLCopenState* . If a stop module is activated in *STANDSTILL* state, the MOVI-PLC® will change to *STOPPING* state.

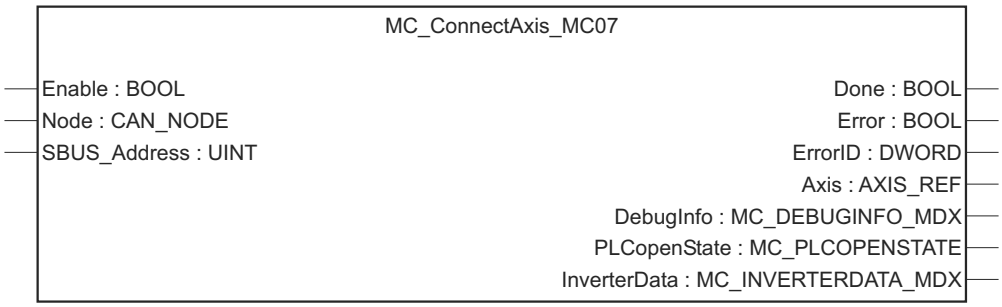
The *STANDSTILL* state will also be active immediately after reset of a limit switch error, even if the motor axis still tries to clear the limit switch.

6. Requirements: Falling edge of the *Enable* input signal and function block were not cancelled.

4.3 Directory MC07_Main

The MC07_Main directory includes the function blocks for administration of the communication between MOVI-PLC® controller and MOVITRAC® 07 and MOVITRAC® B frequency inverters. This directory also includes the function blocks managing these frequency inverters (e. g. enable, reset).

4.3.1 Function block MC_ConnectAxis_MC07



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To ensure that communication between the MOVI-PLC® controller and the MOVITRAC® frequency inverters does not breakup, a different instance must be called cyclically for each motor axis.

Note:

If the function block MC_ConnectAxis_MC07 is not called up cyclically, the frequency inverter will report communication error F47 and enter the "*No enable*" state.

Prerequisites

The following prerequisites have to be met for communication to take place between MOVI-PLC® controller and MOVITRAC® frequency inverter via the MC_ConnectAxis_MC07 function block:

- The system bus address set in the MC_ConnectAxis_MC07 function block and the system address set in the control configuration must be identical to the address set in the inverter parameters (*P813* for X10 connector of MOVITRAC® 07, *P881* for X36 connector of MOVITRAC® B).
- The baud rate set in the control configuration must correspond to the baud rate set in the inverter parameters (*P818* for MOVITRAC® 07, *P884* for MOVITRAC® B).

For communication to take place between the MOVI-PLC® controller in MOVIFIT® FC Technology and the integrated MOVIFIT® FC inverter, the input signal of the MC_ConnectAxis_MC07 function block has to be set as follows:

- *Node*: *SBUS_NODE2*
- *SBUS_Address*: *1*

For MOVIFIT® FC Technology, the baud rate of the CAN 2 bus has a fixed setting of 500 kBaud.

Description

The function block MC_ConnectAxis_MC07 establishes the connection with the controlled motor axis. It is called cyclically in the program and creates a process image of the motor axes at the place where it is called.

Note:

The process image for the inputs and outputs is not formed at the beginning or end of the control cycle.

Instead, the process image for the inputs and outputs is created when the function block MC_ConnectAxis_MC07 is called.

Settings

The function block MC_ConnectAxis_MC07 specifies which interface the MOVI-PLC® controller (system bus CAN 1/2) is connected to and the system bus address that is connected to the controlled frequency inverter via this function block.

Return values

The function block MC_ConnectAxis_MC07 provides the user with various pieces of information, including (Details → "Output signals" table):

- Reference of the motor axis (logical address of the motor axis). This address is used to access other function blocks on the motor axis.
- Debugging information
  - State of the system bus
  - Capacity utilization of the parameter channel
  - etc.
- Current state (→ Sec. "State diagram")
- Inverter data
  - Inverter state
  - Actual speed (calculated) of the motor axis
  - etc.

Effect

The following parameters of the MOVITRAC® frequency inverter are changed once when the MOVI-PLC® controller is connected to the MOVITRAC® frequency inverter via the function block MC_ConnectAxis_MC07 for the first time.

Parameter	Meaning	Value Entered
P870	Process output 1	Control word 1
P871	Process output 2	Speed
P873	Process input 1	Status word 1
P874	Process input 2	Speed (actual value)
P875	Process input 3	Output current
P876	Enable process output data	On
P100	SBus (setpoint source)	
P101	SBus (control signal source)	
P815 (for MOVITRAC® 07) *P883* (for MOVITRAC® B)	SBus TimeOut	300 ms

Input signals

The behavior of the MC_ConnectAxis_MC07 function block depends on the following input signals:

Input signal	Type	Meaning
Enable	BOOL	The input signal *Enable* activates the function block. It acts differently to the general description of the input signal *Enable* given in section 4.1. • *TRUE*: When the function block is called for the first time by setting *Enable* = *TRUE* , the function block is activated and the applied input signals are adopted. In all the following cycles, the MOVI-PLC® controller has to continue to call the function block to prevent communication errors between the MOVI-PLC® controller and the MOVITRAC® frequency inverter in *OperationMode NORMAL* (setting in the control configuration). However, regardless of the status of the *Enable* input signal, changes to the input signals are no longer adopted in the following cycles. The function block can only be reactivated to use the modified input signals after the MOVI-PLC® controller has been reset. • *FALSE*: The task of the function block will not be executed after the MOVI-PLC® controller has been switched on or reset as long as the *Enable* input signal is set to *FALSE*. Once the input signal *Enable* has been set to *TRUE* , however, the input signal *Enable* has no function any longer.
Node	CAN_NODE	The *Node* input signal sets the CAN bus node to which the frequency inverter is connected. • *SBUS_NODE_1*: CAN 1 (X33 connector in DHP11B, X26 connector in compact control, X35 connector with MOVIFIT® for external inverters) • *SBUS_NODE_2*: CAN 2 (X32 connector in DHP11B, for control of the internal MOVIFIT® FC inverter)
SBUS_Address	UINT	The *SBUS_Address* input signal indicates the system bus address of the connected frequency inverter.

Note:

- To transfer the input signals *Node* or *SBUS_Address*, you have to trigger a "Reset" on the MOVI-PLC® controller ([PLC Editor], menu item [Online] / [Reset]).

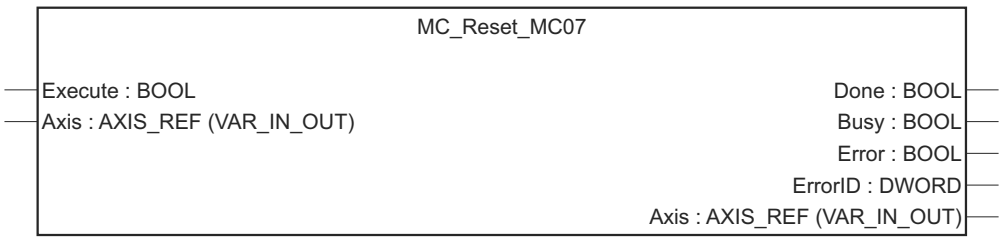
Output signals

The MC_ConnectAxis_MC07 function block indicates the following output signals:

Output signal	Type	Meaning
Done	BOOL	This output signal *Done* indicates whether the initialization of the function block has been completed. • *TRUE*: The function block MC_ConnectAxis_MC07 has completed initialization and set up communication with the frequency inverter. • *FALSE*: Initialization has not yet been completed.
Error	BOOL	This output signal *Error* indicates whether an error has occurred. • *TRUE*: An error has occurred during the execution of the function block. • *FALSE*: No error has occurred.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").
Axis	AXIS_REF	The output signal *Axis* indicates the axis reference. The output signal must be transmitted to all function blocks that refer to this physical motor axis.
DebugInfo	MC_DEBUG-INFO_MDX	This output signal *DebugInfo* is used to locate any errors in the Debug operation mode (setting in the control configuration in the module parameters of the frequency inverter). • *ParameterChannelIdleTime*: This value displays the availability of the parameter channel in %. 0%: Every execution of an MC_ConnectAxisMDX/MX/MC07 instance processes a parameter telegram. 100%: There will be no processing of parameter telegrams. • *PDOxxTransmitCount*: Number of PDOxx that were sent from the MOVI-PLC® controller to the MOVITRAC® frequency inverter. • *PDOxxTransmitTimeStamp*: Time stamp of the PDOxx sent from the MOVI-PLC® controller. • *PDOxxReceiveCounter*: Number of PDOxx that were sent from the MOVITRAC® frequency inverter to the MOVI-PLC® controller. • *PDOxxReceiveTimeStamp*: Time stamp of the PDOxx received by the MOVI-PLC® controller. • *NumberOfReceiveErrors*: Number of errors that occurred when receiving data. • *NumberOfTransmitErrors*: Number of errors that occurred when sending data. • *StateInitConnectAxis*: Status of the ConnectAxis_MC07 module. **Note:** The "MC_DEBUGINFO_MDX" signal type is also permitted for the MC_ConnectAxis_MC07 function block.
PLCopenState	MC_ PLCOPEN-STATE	The *PLCopenState* output signal displays information on the operating status of the motor axis (→ Section "State diagram"). • *NOT_CONNECTED* • *STANDSTILL* • *CONTINUOUS_MOTION* • *STOPPING* • *ERRORSTOP*

Output signal	Type	Meaning
InverterData	MC_ INVERTER-DATA_MDX	The *InverterData* output signal consists of a data structure that determines the current values of the connected motor axis. You will find more detailed information in the following section. • *Error:* An error has occurred in the inverter. • *Referenced*: Reserved • *InverterStatus*: The status of the inverter corresponds to the 7-segment display on the inverter. • *FaultStatus*: Error number of the inverter in case of an error. • *ActualPosition*: Reserved • *ActualModuloPosition*: Reserved • *SetpointSpeed*: Reserved • *ActualSpeed*: Actual speed of the motor axis in the inverter (Unit: 1/min) • *ActualCurrent*: Actual active current of the inverter (Unit: % I_N) • *InverterReady*: Inverter is ready for operation **Notes:** The "MC_INVERTERDATA_MDX" signal type is also permitted for the MC_ConnectAxis_MC07 function block. The data *ActualPosition*, *ActualModuloPosition*, *Referenced* and *SetpointSpeed* do not have any meaning for the MOVITRAC® 07 inverter.

4.3.2 Function block MC_Reset_MC07



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Description

The function block MC_Reset_MC07 acknowledges the errors of MOVITRAC® 07 and MOVITRAC® B frequency inverters.

Errors that occur in a function block of the `MPLCMotion_MC07` library are not acknowledged by this function block. These errors reset themselves automatically once the cause of the error has been removed.

Input signals

The behavior of the MC_Reset_MC07 function block depends on the following input signals:

Input signal	Type	Meaning
Execute	BOOL	The *Execute* input signal acknowledges inverter errors. When a rising edge occurs at this input signal, the function block resets the inverter error.
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

Output signals

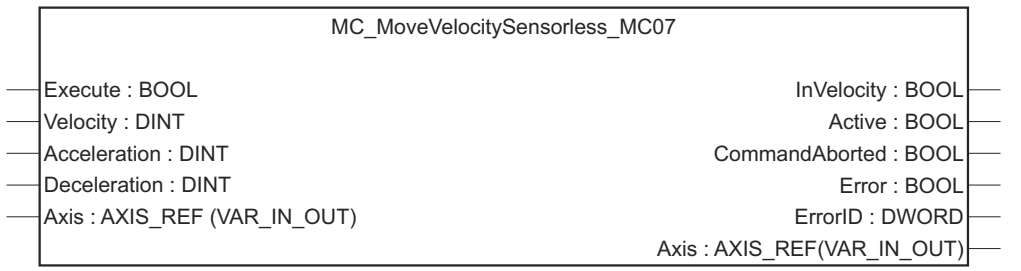
The MC_Reset_MC07 function block indicates the following output signals:

Output signal	Type	Meaning
Done	BOOL	The output signal *Done* indicates whether the reset has been performed. • *TRUE*: Reset successful. • *FALSE*: Reset unsuccessful.
Busy	BOOL	The output signal *Busy* indicates whether the inverter error has been reset. • *TRUE*: The function block is currently resetting the inverter error. • *FALSE*: The function block is not resetting the inverter error at present.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred during the execution of the function block. • *FALSE*: No error has occurred in the function block.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").

4.4 Directory MC07_SingleAxisSensorless

The `MC07_SingleAxisSensorless` directory contains function blocks that enable motion tasks for a motor axis without encoder.

4.4.1 Function block MC_MoveVelocitySensorless_MC07



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Note:

Motor axes without encoder will exhibit a very small maximum torque at speeds below 15 1/min. This means very small external counterforces can result in a noticeable deviation from the set speed in this speed range.

Prerequisites

For the function block MC_MoveVelocitySensorless_MC07 to be executed, the motor axis must be assigned the status *STANDSTILL*, *STOPPING* or *CONTINUOUS_MOTION* in *PLCopenState* (output signal of the function block MC_ConnectAxis_MC07).

Description

The function block MC_MoveVelocitySensorless_MC07 triggers continuous rotation of a motor axis without encoder.

- The input signals *Velocity*, *Acceleration* and *Deceleration* determine the dynamic behavior of the rotation.
- The frequency inverter controls the velocity of the motor axis specified by the input signal *Velocity* until the task of the function block MC_MoveVelocitySensorless_MC07 is cancelled or interrupted (→ Sec. "General functionality of the function blocks," page 15).

Cancellation

The speed control triggered by the function block MC_MoveVelocitySensorless_MC07 is cancelled by the function block MC_StopSensorless_MC07.

Input signals

The behavior of the MC_MoveVelocitySensorless_MC07 function block depends on the following input signals:

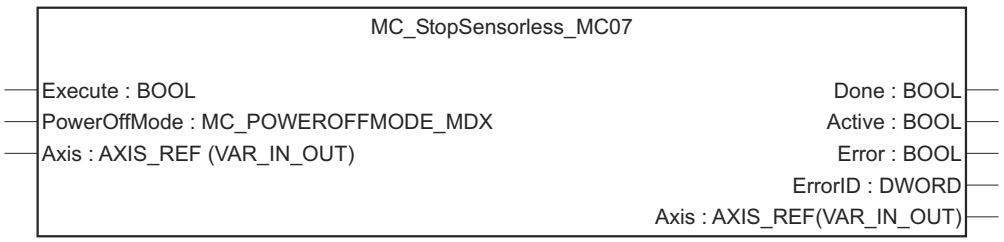
Input signal	Type	Meaning
Execute	BOOL	The *Execute* input signal starts the job of the function block. If a rising edge occurs at this input signal, the function block will start speed control (only if no error has occurred).
Velocity	DINT	This input signal *Velocity* specifies the target setpoint speed of the motor axis rotation. (Unit: 1/ms, maximum setting range: -6000 ... 6000)
Acceleration	DINT	This input signal *Acceleration* specifies the ramp time for acceleration to a speed increased by 3000 1/min (increase of kinetic energy in the motor). (Unit: ms, maximum setting range: 0 ... 2000000)
Deceleration	DINT	This input signal *Deceleration* specifies the ramp time for deceleration to a speed decreased by 3000 1/min (decrease of kinetic energy in the motor). (Unit: ms, maximum setting range: 0 ... 2000000)
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

Output signals

The MC_MoveVelocitySensorless_MC07 function block indicates the following output signals:

Output signal	Type	Meaning
InVelocity	BOOL	This output signal *InVelocity* shows whether the motor axis turns at the target setpoint speed. • *TRUE*: The motor axis turns at the speed specified by the *Velocity* input signal. • *FALSE*: The motor axis is accelerated to reach the target setpoint speed.
Active	BOOL	This output signal *Active* shows whether the motor axis is accelerated or decelerated to reach the setpoint speed. • *TRUE*: The motor axis is accelerated or decelerated. • *FALSE*: The motor axis is not accelerated or decelerated.
Command Aborted	BOOL	This output signal *CommandAborted* shows whether the task of the function block has been cancelled. • *TRUE*: The task of the function block has been cancelled. • *FALSE*: The task of the function block has not been cancelled.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred in the function block. • *FALSE*: No error has occurred in the function block.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").

4.4.2 Function blocks MC_AxisStopSensorless_MC07 and MC_StopSensorless_MC07



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Note:

Motor axes without encoder show a very small maximum torque in the speed control status at speeds of less than 15 1/min. The function blocks MC_AxsisStopSensorless_MC07 and MC_StopSensorless_MC07 close the motor brake shortly before standstill of the motor axis so that the motor axis can reliably decelerate to standstill (→ Meaning of the input signal *PowerOffMode*).

Description

The function block MC_AxisStopSensorless_MC07 slows the current rotational movement of the motor axis using the ramp t11 (P131) set in the frequency inverter.

The function block MC_StopSensorless_MC07 slows the current rotational movement of the motor axis using the stop ramp t13 (P136) set in the frequency inverter.

Note:

As long as the input signal *Execute* is set to *TRUE*, the motor axis will remain in PLCopenState *STOPPING* (output signal of the MC_ConnectAxis_MC07 function block). This means a motion task for a subsequent movement cannot be performed.

To be able to leave the PLCopenState *STOPPING*, the *Execute* input signal of the function block must be reset to *FALSE* in at least one call of the function block.

Cancellation

The prerequisite for both cancellation options is that the input signal *Execute* of the active stop function block must be executed with the value *FALSE* at least once.

The braking action triggered by the MC_AxisStopSensorless_MC07 or MC_StopSensorless_MC07 function block can be cancelled with the MC_MoveVelocitySensorless_MC07 or MC_MoveTargetSpeedSensorless_MC07 function block.

You can also replace the MC_AxisStopSensorless_MC07 function block with the MC_StopSensorless_MC07 function block.

Effect

The braking action triggered by the MC_AxisStopSensorless_MC07 function block will be executed with the ramp t11 of the inverter set in parameter P131. Parameter P131 is described by the function blocks MC_MoveVelocitySensorless_MC07, MC_MoveTargetSpeedSensorless_MC07 and MC_SetDynamics_MC07 (input signal *Deceleration*).

The braking action triggered by the MC_StopSensorless_MC07 function block will be executed with the stop ramp t13 of the inverter set in parameter P136.

Input signals

The behavior of the MC_AxisStopSensorless_MC07 / MC_StopSensorless_MC07 function block depends on the following input signals:

Input signal	Type	Meaning
Execute	BOOL	This input signal *Execute* is used to start the braking process for the motor axis. When a rising edge occurs at this input signal, the function block starts to slow the motor axis.
PowerOffMode	MC_POWEROFFMODE_MDX	The input signal *PowerOffMode* sets the state the frequency inverter assumes when it is deactivated with the MC_AxisStopSensorless_MC07 or MC_StopSensorless_MC07 function blocks. • *MDX_CTRL_INHIBIT* : The frequency inverter changes to the status "*Controller inhibit*" (-> inverter status 1). If the motor is equipped with a motor brake, it will now become effective. If no brake is installed, the motor will coast to standstill. • *MDX_NO_ENABLE* : The frequency inverter changes to the status "*No enable* " (-> inverter status 2). The motor is decelerated in a controlled manner. Whether or not the motor brake is activated in inverter status 2 depends on the setting of the drive parameter *P730*. The brake function is active in the basic setting, this means the motor brake will be activated after reaching standstill (the brake will always be activated in inverter status 1). This input is also used to switch between "*Controller inhibit*" and "*No enable*" when the frequency inverter is switched off (*Enable* = *FALSE*). **Note:** The signal type "MC_POWEROFFMODE_MDX" is also permitted for the MC_AxisStopSensorless_MC07 and MC_StopSensorless_MC07 function blocks.
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

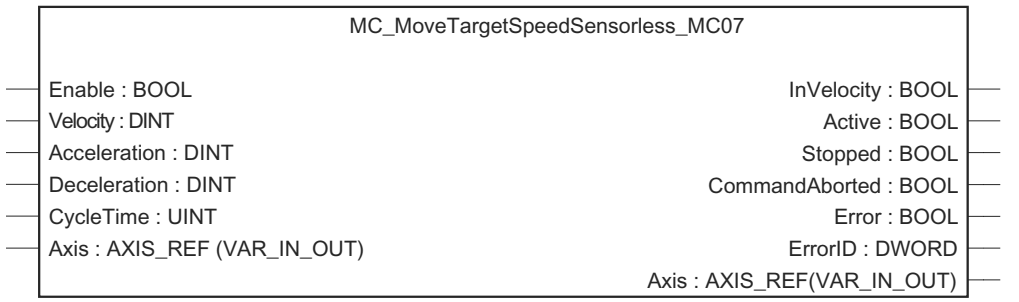
Output signals

The MC_AxisStopSensorless_MC07 / MC_StopSensorless_MC07 function block indicates the following output signals:

Output signal	Type	Meaning
Done	BOOL	The output signal *Done* indicates whether the braking action of the motor axis has been completed. • *TRUE*: The braking process of the motor axis is completed. The motor axis is at a standstill (status of motor axis: "*No enable*" or "*Controller inhibit*", depending on the input signal *PowerOffMode*). • *FALSE*: The braking process of the motor axis is not yet complete.
Active	BOOL	This output signal *Active* indicates whether the motor axis is rotating. • *TRUE*: The motor axis is rotating. • *FALSE*: The motor axis is not rotating.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred in the function block. • *FALSE*: No error has occurred in the function block.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").

4.5 Directory MC07_SingleAxisSEW

4.5.1 Function block MC_MoveTargetSpeedSensorless_MC07



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Prerequisites

For the function block MC_MoveTargetSpeedSensorless_MC07 to be executed, the motor axis must be assigned the status *STANDSTILL*, *STOPPING* or *CONTINUOUS_MOTION* in *PLCopenState* (output signal of the function block MC_ConnectAxis_MC07).

Description

The function block MC_MoveTargetSpeedSensorless_MC07 executes a continuous rotation of the motor axis if the input signal *Enable* is set to *TRUE*. As long as these prerequisites are not met, the function block will issue the *TRUE* signal at the *Error* output.

In contrast to the MC_MoveTargetSpeedSensorless_MC07 function block, the MC_MoveTargetSpeed Sensorless_MC07 function block does not require a rising edge at the input signal *Execute* once the requirements have been met. It is sufficient to set the input signal *Enable* to *TRUE* to start the rotary motion.

Note:

Unlike execution of the function blocks MC_StopSensorless_MC07 or MC_AxisStopSensorless_MC07, the motor axis remains in the *PLCopenState CONTINUOUS_MOTION* during the braking action that was triggered by a falling edge at the *Enable* input signal of the MC_MoveTargetSpeedSensorless_MC07 function block.

Note:

Motor axes without encoders can be operated at very small torques at speeds of less than 15 rev/min in the speed control status.

Input signals

The behavior of the MC_MoveTargetSpeedSensorless_MC07 function block depends on the following input signals:

Input signal	Type	Meaning
Enable	BOOL	The input signal *Enable* activates the function block. The order of the function block to travel with target velocity (→ Input signal *Velocity*) is executed if the input signal *Enable* is set to *TRUE*. In case of a falling edge of the *Enable* input signal, the axis is decelerated until standstill with brake acceleration that is present at the *Deceleration* input signal in case of a falling edge at the *Enable* input signal. The *Axis* input signal will be adopted in case of a rising edge at the *Enable* input signal or after meeting the requirements for execution of the function block. All other input signals are read in when the function block is activated and adopted cyclically according to the *CycleTime* input signal.
Velocity	DINT	This input signal *Velocity* specifies the motor speed during the constant speed phase. (Unit: 1/ms, maximum setting range: -6000 ... 6000)
Acceleration	DINT	This input signal *Acceleration* specifies the ramp time for acceleration to a speed increased by 3000 1/min (increase of kinetic energy in the motor). (Unit: ms, maximum setting range: 0 ... 2000000)
Deceleration	DINT	This input signal *Deceleration* specifies the ramp time for deceleration to a speed decreased by 3000 1/min (decrease of kinetic energy in the motor). (Unit: ms, maximum setting range: 0 ... 2000000)
CycleTime	UINT	The *CycleTime* input signal determines the minimum cycle time in which the values of the input signals *Velocity*, *Acceleration* and Deceleration are transmitted cyclically to the frequency inverter. These values are transmitted in case of a change only. The result is a reduction in bus load. The result is a specific reduction in bus load by increasing the value at the *CycleTime* input signal.
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

Output signals

The MC_MoveTargetSpeedSensorless_MC07 function block indicates the following output signals:

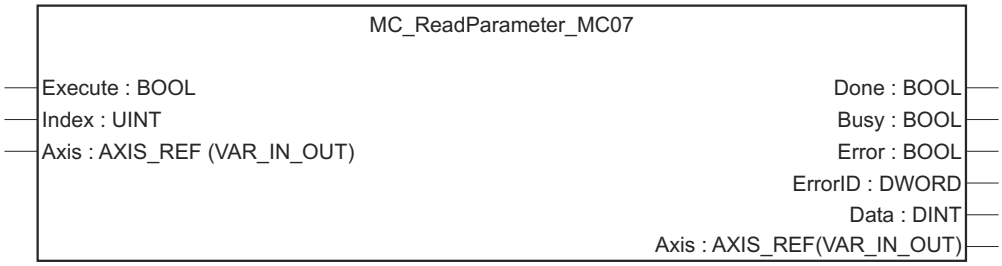
Output signal	Type	Meaning
InVelocity	BOOL	This output signal *InVelocity* shows whether the motor axis turns at the target setpoint speed. • *TRUE*: The motor axis turns at the speed specified by the *Velocity* input signal. • *FALSE*: The motor axis is accelerated to reach the target setpoint speed.
Active	BOOL	This output signal *Active* indicates whether the motor axis is accelerated or decelerated to reach the setpoint speed or reaches standstill with *Enable* = *FALSE*. • *TRUE*: The motor axis is accelerated or decelerated. • *FALSE*: The motor axis is not accelerated or decelerated.
Stopped	BOOL	The motor axis was decelerated and is now in *PLCopenState STANDSTILL*.
Command Aborted	BOOL	This output signal *CommandAborted* shows whether the task of the function block has been cancelled. It includes the motion required to reach or travel with set velocity as well as the braking action triggered by removing the *Enable* input signal. • *TRUE*: The task of the function block has been cancelled. • *FALSE*: The task of the function block has not been cancelled. A new rising edge at the *Enable* input signal to execute the motion order once again. **Example:** If the *Enable* input signal is set to *FALSE* after cancellation, it will not result in a braking action.

Output signal	Type	Meaning
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred in the function block. • *FALSE*: No error has occurred in the function block.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").

4.6 Directory MC07_InverterParameters

The `MC07_InverterParameters` directory contains function blocks required to write and read parameters of the MOVITRAC® 07 frequency inverter and MOVITRAC® B.

4.6.1 Function block MC_ReadParameter_MC07



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Description

The function block MC_ReadParameter_MC07 is used to read parameters (indices) of the frequency inverter into the MOVI-PLC® controller.

Input signals

The behavior of the MC_ReadParameter_MC07 function block depends on the following input signals:

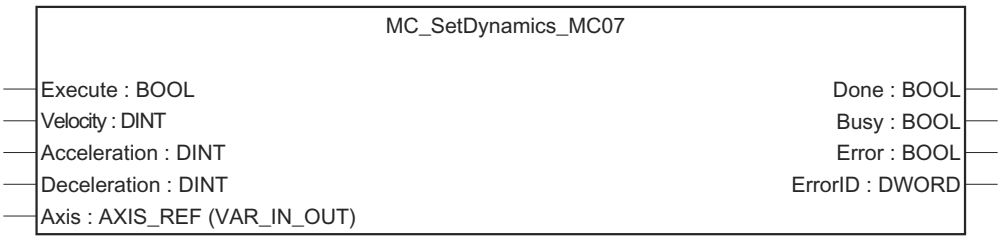
Input signal	Type	Meaning
Execute	BOOL	This input signal *Execute* is used to start the reading process of the parameter. When a rising edge occurs at this input signal, the function block starts to transfer the parameter from the frequency inverter to the MOVI-PLC® controller.
Index	UINT	This input signal *Index* specifies which parameter is to be transferred from the frequency inverter to the MOVI-PLC® controller. The index number of the parameter can be displayed in Shell of the MOVITOOLS® MotionStudio software. To do so, place your cursor in the relevant paramter field and press <CTRL> + <F1>.
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

Output signals

The MC_ReadParameter_MC07 function block indicates the following output signals:

Output signal	Type	Meaning
Done	BOOL	The output signal *Done* indicates whether the parameter was transmitted successfully. • *TRUE*: The value of the parameter at the *Data* output signal is valid. • *FALSE*: The parameter has not been transmitted.
Busy	BOOL	The output signal *Busy* indicates whether the parameter is currently being transmitted. • *TRUE*: The parameter is being transferred. • *FALSE*: The parameter is not being transmitted at present.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred during parameter transfer. • *FALSE*: No error has occurred.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").
Data	DINT	This output signal *Data* contains the transmitted parameter value.

4.6.2 Function block MC_SetDynamics_MC07



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Description

The MC_SetDynamics_MC07 function block changes the dynamics parameters during execution of a Continuous-Motion function block, an MC_AxisStopSensorless_MC07 or MC_StopSensorless_MC07 function block. The input signals *Velocity, Acceleration* and *Deceleration* determine the dynamic behavior of the rotation.

If the MC_SetDynamics_MC07 function block is executed prior to a Continuous-Motion function block, the set dynamics parameters are overwritten with those input signals during execution of the motion function blocks.

Input signals

The behavior of the MC_SetDynamics_MC07 function block depends on the following input signals:

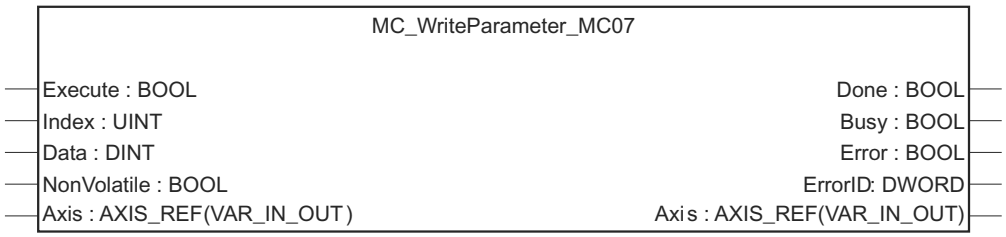
Input signal	Type	Meaning
Execute	BOOL	The *Execute* input signal starts the job of the function block. When a rising edge occurs at this input signal, the function block changes the dynamic parameters of the motor rotation according to the *Velocity*, *Acceleration* and *Deceleration* input signals.
Velocity	DINT	This input signal *Velocity* specifies the target setpoint speed of the motor rotation. (Unit: 1/min, maximum setting range -6000 ... 6000)
Acceleration	DINT	This input signal *Acceleration* specifies the ramp time for acceleration to a speed increased by 3000 1/min (increase of kinetic energy in the motor). (Unit: ms, maximum setting range: 0 ... 2000000)
Deceleration	DINT	This input signal *Deceleration* specifies the ramp time for deceleration to a speed decreased by 3000 1/min (decrease of kinetic energy in the motor). (Unit: ms, maximum setting range: 0 ... 2000000)
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

Output signals

The MC_SetDynamics_MC07 function block indicates the following output signals:

Output signal	Type	Meaning
Done	BOOL	The *Done* output signal indicates whether the new *Velocity*, *Acceleration* and *Deceleration* dynamics parameters have been successfully overwritten. • *TRUE*: Parameter has been written successfully. • *FALSE*: Parameter not yet written completely.
Busy	BOOL	The *Busy* output signal indicates whether the new dynamics parameters have been transmitted to the inverter. • *TRUE*: New dynamic parameters are transmitted to the inverter. • *FALSE*: No new dynamic parameters are transmitted to the inverter.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred in the function block. • *FALSE*: No error has occurred in the function block.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").

4.6.3 Function block MC_WriteParameter_MC07



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Important:

Changes in parameters may result in unexpected operating states and may be executed by trained personnel only.

Description

The function block MC_WriteParameter_MC07 is used to transmit parameters (indices) from the MOVI-PLC® controller to the frequency inverter.

Input signals

The behavior of the MC_WriteParameter_MC07 function block depends on the following input signals:

Input signal	Type	Meaning
Execute	BOOL	This input signal *Execute* is used to start the transmission of the parameter. When a rising edge occurs at this input signal, the function block starts to transmit the parameter from the MOVI-PLC® controller to the frequency inverter.
Index	UINT	The input signal *Index* specifies which parameter is to be transmitted from the MOVI-PLC® controller to the frequency inverter. The index number of the parameter can be displayed in Shell (for MOVITRAC® 07) or the parameter tree (for MOVITRAC® B) of the MOVITOOLS® MotionStudio software. To do so, place your cursor in the relevant paramter field and press <CTRL> + <F1>.
Data	DINT	This input signal *Data* contains the transmitted parameter value.
NonVolatile	BOOL	This input signal *NonVolatile* specifies whether the parameter should be copied to the non-volatile memory. • *TRUE*: The parameter is transmitted to the non-volatile memory of the frequency inverter. The parameter value is still stored once the frequency inverter is switched off and then on again. • *FALSE*: The parameter is transmitted to the volatile memory of the frequency inverter. When the frequency inverter is switched off and then back on again, the parameter is reset to its original value.
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

Output signals

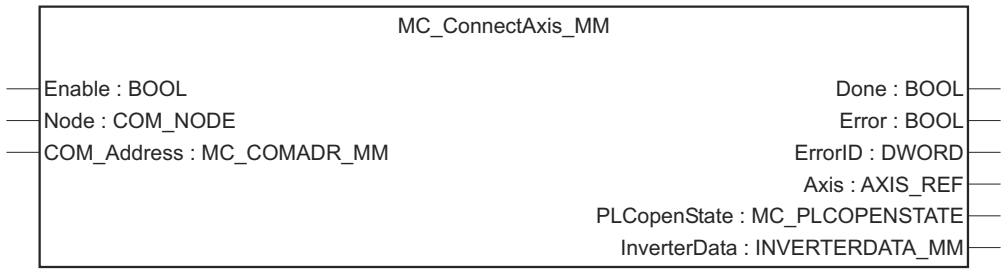
The MC_WriteParameter_MC07 function block indicates the following output signals:

Output signal	Type	Meaning
Done	BOOL	The output signal *Done* indicates whether the parameter was transmitted successfully. • *TRUE*: The parameter was successfully transmitted by the MOVI-PLC® controller to the frequency inverter. • *FALSE*: The parameter has not been transmitted.
Busy	BOOL	The output signal *Busy* indicates whether the parameter is currently being transmitted. • *TRUE*: The parameter is being transferred. • *FALSE*: The parameter is not being transmitted at present.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred during parameter transfer. • *FALSE*: No error has occurred.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").

4.7 Directory MM_Main

The directory `MM_Main` includes function blocks for managing communication between the MOVI-PLC® controller and the MOVIMOT® frequency inverter. This directory also includes function blocks for managing the frequency inverter (e.g. enable, reset).

4.7.1 Function block MC_ConnectAxis_MM



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To ensure that communication between the MOVI-PLC® controller and the MOVIMOT® frequency inverters does not breakup, a different instance must be called cyclically for each motor axis.

Note:

If the MC_ConnectAxis_MM function block is not called cyclically, the frequency inverter will indicate the "Timeout" error (flashing green/yellow) and changes or stays in the "*No enable*" state.

Prerequisites

The following prerequisites have to be met for communication to take place between MOVI-PLC® controller and MOVIMOT® frequency inverter via the MC_ConnectAxis_MM function block:

- The COM address set in the MC_ConnectAxis_MM function block and in the control configuration have to be identical with the address set at the DIP switch of the MOVIMOT® frequency inverter.
- The baud rate set in the control configuration must be 9.6 kBaud.

Description

The function block MC_ConnectAxis_MM establishes the connection with the controlled motor axis. It is called cyclically in the program and creates a process image of the motor axes at the place where it is called.

Note:

The process image for the inputs and outputs is not formed at the beginning or end of the control cycle.

Instead, the process image for the inputs and outputs is created when the function block MC_ConnectAxis_MM is called.

Settings

The function block MC_ConnectAxis_MM specifies to which COM interface the MOVI-PLC® controller is connected to and to which COM address the frequency inverter controlled via this function block is connected. You can choose from the following COM interfaces:

- COM 2 at the OST11B option card
- COM 1 at MOVIFIT® MC
- COM 2 at MOVIFIT® MC
- COM 3 at MOVIFIT® MC

Return values

The function block MC_ConnectAxis_MM provides the user with various pieces of information, including (Details → "Output signals" table):

- Reference of the motor axis (logical address of the motor axis). This address is used to access other function blocks on the motor axis.
- Current state (→ Sec. "State diagram")
- Inverter data
  - Inverter state
  - Inverter status
  - Set speed
  - Actual current
  - Error
  - Error status
  - etc.

Input signals

The behavior of the MC_ConnectAxis_MM function block depends on the following input signals:

Input signal	Type	Meaning
Enable	BOOL	The input signal *Enable* activates the function block. It acts differently to the general description of the input signal *Enable* given in section 4.1. • *TRUE*: When the function block is called for the first time by setting *Enable* = *TRUE* , the function block is activated and the applied input signals are adopted. In all the following cycles, the MOVI-PLC® controller has to continue to call the function block to prevent communication errors between the MOVI-PLC® controller and the MOVIMOT® frequency inverter in *OperationMode NORMAL* (setting in the control configuration). However, regardless of the status of the *Enable* input signal, changes to the input signals are no longer adopted in the following cycles. The function block can only be reactivated to use the modified input signals after the MOVI-PLC® controller has been reset. • *FALSE*: The task of the function block will not be executed after the MOVI-PLC® controller has been switched on or reset as long as the *Enable* input signal is set to *FALSE*. Once the input signal *Enable* has been set to *TRUE* , however, the input signal *Enable* has no function any longer.
Node	COM_NODE	The *Node* input signal sets the COM bus node to which the MOVIMOT® frequency inverter is connected. • COM_NODE_1: COM 1 (Connector X71 at MOVIFIT® MC) • COM_NODE_2: COM 2 (X36 connector at OST11B card, X81 connector at MOVIFIT® MC • COM_NODE_3: COM 3 (X91 connector at MOVIFIT® MC)
COM_Address	MC_ COMADR	The *COM_Address* input signal indicates the bus address of the connected MOVIMOT® frequency inverter.

Note:

- To transfer the input signals *Node* or *COM_Address*, you have to trigger a "Reset" on the MOVI-PLC® controller ([PLC Editor], menu item [Online] / [Reset]).

Output signals

The MC_ConnectAxis_MM function block indicates the following output signals:

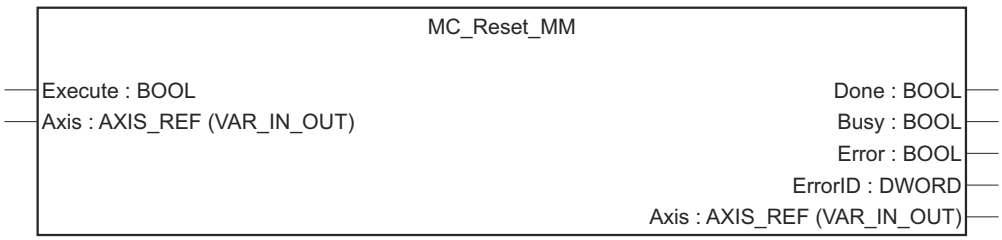
Output signal	Type	Meaning
Done	BOOL	This output signal *Done* indicates whether the initialization of the function block has been completed. • *TRUE*: The function block MC_ConnectAxis_MM has completed initialization and set up communication with the frequency inverter. • *FALSE*: Initialization has not yet been completed.
Error	BOOL	This output signal *Error* indicates whether an error has occurred. • *TRUE*: An error has occurred during the execution of the function block. • *FALSE*: No error has occurred.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").
Axis	AXIS_REF	The output signal *Axis* indicates the axis reference. The output signal must be transmitted to all function blocks that refer to this physical motor axis.
PLCopenState	MC_PLCOPEN-STATE	The *PLCopenState* output signal displays information on the operating status of the motor axis (→ Section "State diagram"). • *NOT_CONNECTED* • *STANDSTILL* • *CONTINUOUS_MOTION* • *STOPPING* • *ERRORSTOP*
InverterData	MC_USER-DATA_MM	The *InverterData* output signal consists of a data structure that determines the current values of the connected motor axis. You will find more detailed information in the following section.

Data structure InverterData

This directory shows the currently valid process values of the drive.

Structure/Process value	Description
InverterData	
InverterStatus	This value indicates the drive status: • *NOT_READY*: The drive is not ready for operation • *NOT_ENABLED*: The drive is not enabled (no enable). • *ENABLED*: The drive is enabled.
SetpointSpeed:	This value indicates the set speed of the drive: (Unit: 1/min)
ActualCurrent:	This value indicates the apparent current of the drive: (Unit: % of the rated inverter current)
Error	This value indicates whether an error has occurred at the drive. • *TRUE*: An error has occurred at the drive. • *FALSE*: No error has occurred.
FaultStatus:	This value displays the error code of the error. (→ Sec. "Error identifier")

4.7.2 Function block MC_Reset_MM



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Description

The function block MC_Reset_MM is used to acknowledge errors of the MOVIMOT® frequency inverter.

Errors that occur in a function block of the `MPLCMotion_MM` library are not acknowledged by this function block. These errors reset themselves automatically once the cause of the error has been removed.

Input signals

The behavior of the MC_Reset_MM function block depends on the following input signals:

Input signal	Type	Meaning
Execute	BOOL	The *Execute* input signal acknowledges inverter errors. When a rising edge occurs at this input signal, the function block resets the inverter error.
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

Output signals

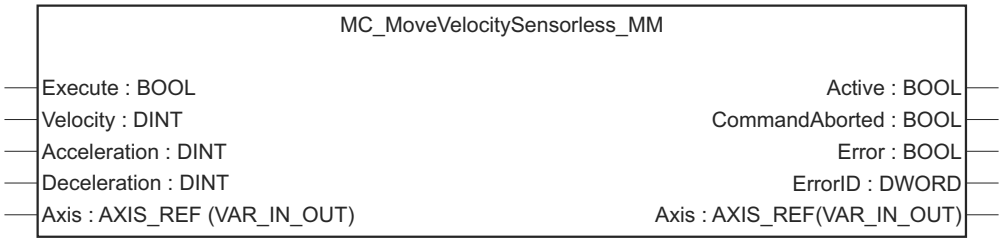
The MC_Reset_MM function block indicates the following output signals:

Output signal	Type	Meaning
Done	BOOL	The output signal *Done* indicates whether the reset has been performed. • *TRUE*: Reset successful. • *FALSE*: Reset unsuccessful.
Busy	BOOL	The output signal *Busy* indicates whether the inverter error has been reset. • *TRUE*: The function block is currently resetting the inverter error. • *FALSE*: The function block is not resetting the inverter error at present.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred during the execution of the function block. • *FALSE*: No error has occurred in the function block.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").

4.8 Directory MM_SingleAxis

The `MM_SingleAxis` directory contains function blocks that enable motion tasks for a motor axis without encoder.

4.8.1 Function block MC_MoveVelocitySensorless_MM



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Application

Motor axes without encoder will exhibit a very small maximum torque at speeds below 15 1/min. This means very small external counterforces can result in a noticeable deviation from the set speed in this speed range.

Prerequisites

For the function block MC_MoveVelocitySensorless_MM to be executed, the motor axis must be assigned the status *STANDSTILL*, *STOPPING* or *CONTINUOUS_MOTION* in *PLCopenState* (output signal of the function block MC_ConnectAxis_MM).

Description

The function block MC_MoveVelocity_MM triggers continuous rotation of a motor axis without encoder.

The input signals *Velocity*, *Acceleration* and *Deceleration* determine the dynamic behavior of the rotation.

Cancellation

The speed control triggered by the MC_MoveVelocitySensorless_MM function block will be cancelled by the MC_StopSensorless_MM function block (→ Sec. "General behavior of the function blocks," page 15).

Input signals

The behavior of the MC_MoveVelocitySensorless_MM function block depends on the following input signals:

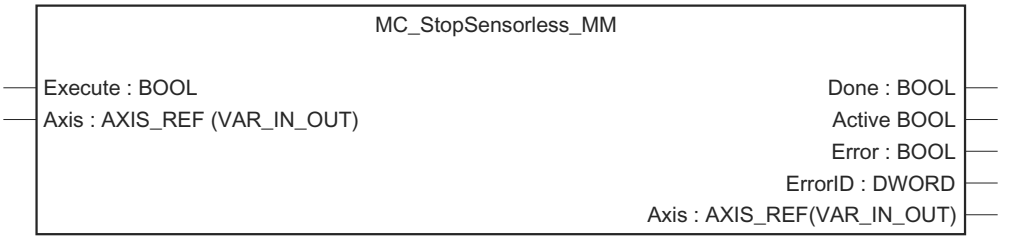
Input signal	Type	Meaning
Execute	BOOL	The *Execute* input signal starts the job of the function block. When a rising edge occurs at this input signal, the function block starts the speed control.
Velocity	DINT	This input signal *Velocity* specifies the target setpoint speed of the motor axis rotation. (Unit: 1/ms, maximum setting range: -3000 ... 3000)
Acceleration	DINT	This input signal *Acceleration* specifies the ramp time for acceleration to a speed increased by 1500 1/min (increase of kinetic energy in the motor). (Unit: ms, maximum setting range: 100 ... 2000000)
Deceleration	DINT	This input signal *Deceleration* specifies the ramp time for deceleration to a speed decreased by 1500 1/min (decrease of kinetic energy in the motor). (Unit: ms, maximum setting range: 100 ... 2000000)
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

Output signals

The MC_MoveVelocitySensorless_MM function block indicates the following output signals:

Output signal	Type	Meaning
Active	BOOL	This output signal *Active* shows whether the motor axis is accelerated or decelerated to reach the setpoint speed. • *TRUE*: The motor axis is accelerated or decelerated. • *FALSE*: The motor axis is not accelerated or decelerated.
Command Aborted	BOOL	This output signal *CommandAborted* shows whether the task of the function block has been cancelled. • *TRUE*: The task of the function block has been cancelled. • *FALSE*: The task of the function block has not been cancelled.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred in the function block. • *FALSE*: No error has occurred in the function block.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").

4.8.2 Function block MC_StopSensorless_MM



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Note:

Motor axes without encoder show a very small maximum torque in the speed control status at speeds of less than 15 1/min. The MC_StopSensorless_MM function block closes the motor brake shortly before standstill of the motor axis so that the motor axis is decelerated safely until standstill. Furthermore, the frequency inverter switches to the status "*No enable*."

Description

The function block MC_StopSensorless_MM slows the current rotational movement of the motor axis using the ramp set in the frequency inverter.

Note:

The *PLCopenState* of the motor axis remains in the status *STOPPING* as long as the *Execute* input signal is set to *TRUE*. This means a motion task for a subsequent movement cannot be performed.

To be able to leave the PLCopenState *STOPPING*, the *Execute* input signal of the function block must be reset to *FALSE* in at least one call of the function block.

Cancellation

The braking action triggered by the MC_StopSensorless_MM function block is cancelled by the "*No enable*" status.

When this status occurs, the motor axis is decelerated with the highest possible braking effect.

Effect

Note:

The execution of the MC_StopSensorless_MM function block is cancelled, if:

- a rising edge occurs at the *Execute* input signal of an instance in the MC_MoveVelocitySensorless_MM function block
- and when the *Execute* input signal of the MC_StopSensorless_MM function block is no longer set to *TRUE*.

This behavior for motor axes without encoders has the following reason:

There is to be a smooth change for motor axes without encoder from speed 0 to a different speed.

Input signals

The behavior of the MC_StopSensorless_MM function block depends on the following input signals:

Input signal	Type	Meaning
Execute	BOOL	This input signal *Execute* is used to start the braking process for the motor axis. When a rising edge occurs at this input signal, the function block starts to slow the motor axis.
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

Output signals

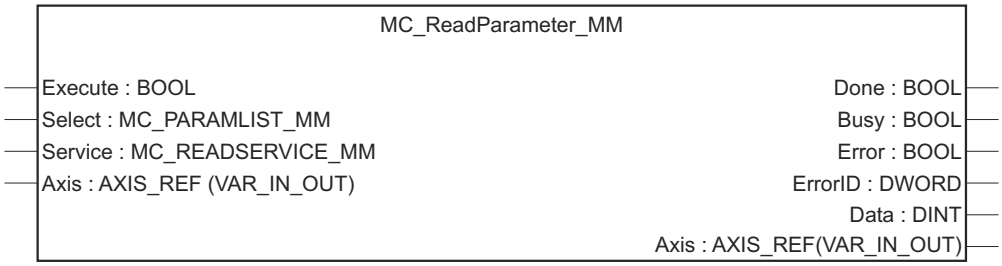
The MC_StopSensorless_MM function block indicates the following output signals:

Output signal	Type	Meaning
Done	BOOL	The output signal *Done* indicates whether the braking action of the motor axis has been completed. • *TRUE*: The braking process of the motor axis is completed. The motor axis is at a standstill (status of motor axis: "*No enable*"). • *FALSE*: The braking process of the motor axis is not yet complete.
Active	BOOL	This output signal *Active* indicates whether the motor axis is rotating. • *TRUE*: The motor axis is rotating. • *FALSE*: The motor axis is not rotating.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred in the function block. • *FALSE*: No error has occurred in the function block.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").

4.9 Directory MM_InverterParameters

The `MM_InverterParameters` directory contains function blocks required to write and read parameters of the MOVIMOT® frequency inverter.

4.9.1 Function block MC_ReadParameter_MM



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Description

The function block MC_ReadParameter_MM is used to read parameters (indices) of the frequency inverter into the MOVI-PLC® controller.

Input signals

The behavior of the MC_ReadParameter_MM function block depends on the following input signals:

Input	Type	Meaning
Execute	BOOL	This input signal *Execute* is used to start the reading process of the parameter. When a rising edge occurs at this input, the function block starts to transfer the parameter from the frequency inverter to the MOVI-PLC® controller.
Select	MC_ PARAMLIST _MM	This input signal *Select* specifies which parameter is to be transferred from the frequency inverter to the MOVI-PLC® controller. • *MM_RAMP_UP*: Ramp up • *MM_RAMP_DOWN*: Ramp down • *MM_MIN_SPEED*: Minimum frequency • *MM_MAX_SPEED*. Maximum frequency • *MM_CURR_LIMIT*: Current limit • *MM_PRE_MAGTIME*: Pre-magnetization time • *MM_POST_MAGTIME*: Post-magnetization time • *MM_SPEEDMON_DELTIME*: Speed monitoring delay time • *MM_BRAKE_RELTIME*: Brake release time • *MM_SLIP_COM*: Slip compensation
Service	MC_ READ SERVICE _MM	This input signal *Service* specifies which parameter value is to be transferred from the frequency inverter to the MOVI-PLC® controller. • *READ_VALUE*: The current parameter value will be transmitted. • *READ_MIN*: The smallest permitted parameter value will be transmitted. • *READ_MAX*: The largest permitted parameter value will be transmitted. • *READ_DEAFAULT*: The factory setting parameter value will be transmitted.
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

Parameters

The following table shows the parameters that can be transmitted. The *Select* input signal determines which of the following parameters will be transmitted:

Name	Range	Index	Parameter number	Step width	Default value
Ramp up	0.1...2000 [s]	8807	130	0.1 s – 1 s: 0.01 1 s – 10 s: 0.1 10 s – 100 s: 1 100 s – 2000 s: 10	depends on potentiometer t1 of MOVIMOT®
Ramp down	0.1...2000 [s]	8808	131		
Minimum frequency	2...100 [Hz]	8899	305	0.1	depends on Potentiometer f2 of MOVIMOT®
Maximum frequency	2...100 [Hz]	8900	306	0.1	depends on the setting of the MOVIMOT® potentiometer f1
Current limit	60...160 [%]	8518	303	1	160 [%]
Pre-magnetization time	0...2 [s]	8526	323	0.001	depends on motor
Post-magnetization time	0...2 [s]	8585	732	0.001	0.1 [s]
Delay time Speed monitoring	0.1...10.0 [s]	8558	501	0.1	1 [s]
Brake release time	0..2 [s]	8749	731	0.001	0
Slip compensation	0...500 [1/min]	8527	324	0.2	Rated motor slip [1]

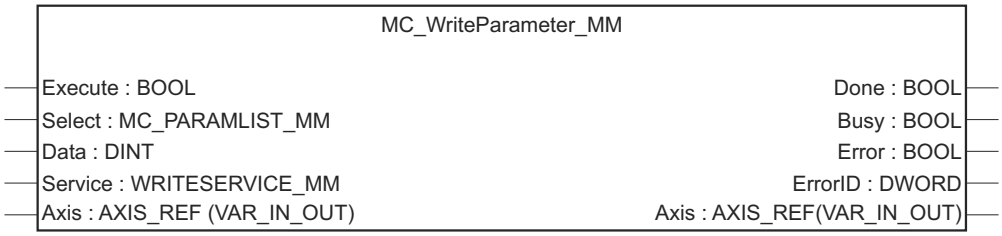
1) The value will be set to the rated motor slip when there is a change in the additional function setting.

Output signals

The MC_ReadParameter_MM function block indicates the following output signals:

Output signal	Type	Meaning
Done	BOOL	The output signal *Done* indicates whether the parameter was transmitted successfully. • *TRUE*: The value of the parameter at the *Data* output signal is valid. • *FALSE*: The parameter has not been transmitted.
Busy	BOOL	The output signal *Busy* indicates whether the parameter is currently being transmitted. • *TRUE*: The parameter is being transferred. • *FALSE*: The parameter is not being transmitted at present.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred during parameter transfer. • *FALSE*: No error has occurred.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").
Data	DINT	This output signal *Data* contains the transmitted parameter value.

4.9.2 Function block MC_WriteParameter_MM



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Important:

Changing parameters manually can lead to unforeseeable operating states. Use this function block after contacting SEW-EURODRIVE only.

Description

The function block MC_WriteParameter_MM is used to transmit parameters (indices) from the MOVI-PLC® controller to the frequency inverter.

Input signals

The behavior of the MC_WriteParameter_MM function block depends on the following input signals:

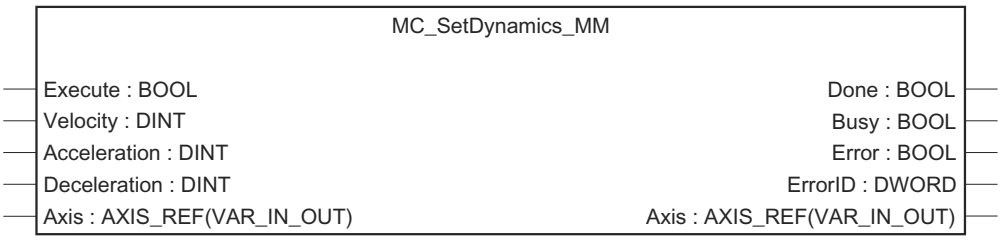
Input signal	Type	Meaning
Execute	BOOL	This input signal *Execute* is used to start the transmission of the parameter. When a rising edge occurs at this input signal, the function block starts to transmit the parameter from the MOVI-PLC® controller to the frequency inverter.
Select	MC_PARAMLIST_MM	The input signal *Select* specifies which parameter is to be transmitted from the MOVI-PLC® controller to the frequency inverter (→ Section "Parameter", page 50).
Data	DINT	This input signal *Data* contains the transmitted parameter value.
Service	MC_WRITESERVICE_MM	This input signal *Service* specifies whether the parameter should be copied to the non-volatile memory. • *WRITE_NONVOLATILE*: The parameter is transmitted to the non-volatile memory of the frequency inverter. The parameter value is still stored once the frequency inverter is switched off and then on again. • *WRITE_VOLATILE*: The parameter is transmitted to the volatile memory of the frequency inverter. When the frequency inverter is switched off and then back on again, the parameter is reset to its original value.
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

Output signals

The MC_WriteParameter_MM function block indicates the following output signals:

Output signal	Type	Meaning
Done	BOOL	The output signal *Done* indicates whether the parameter was transmitted successfully. • *TRUE*: The parameter was successfully transmitted by the MOVI-PLC® controller to the frequency inverter. • *FALSE*: The parameter has not been transmitted.
Busy	BOOL	The output signal *Busy* indicates whether the parameter is currently being transmitted. • *TRUE*: The parameter is being transferred. • *FALSE*: The parameter is not being transmitted at present.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred during parameter transfer. • *FALSE*: No error has occurred.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").

4.9.3 Function block MC_SetDynamics_MM



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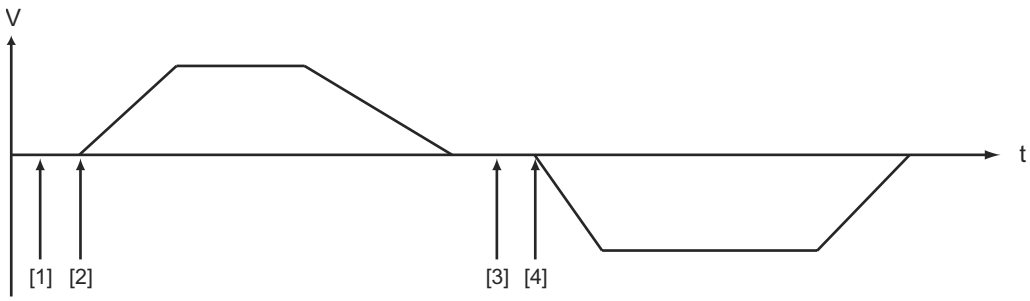
Application

Example:

As the dynamics parameters *Acceleration* and *Deceleration* are transmitted via the parameter channel, these changes will become effective after a certain delay only.

The MC_SetDynamics_MM function block checks for each rising edge at the *Execute* input signal to see if the dynamics parameters have been changed. If the dynamics parameter has been changed, the MC_SetDynamics_MM function block will initially transmit the dynamics parameters and then the *Velocity* parameter to the frequency inverter.

The MC_SetDynamics_MM function block lets users transmit the dynamics parameters prior to a change in velocity. The advantage is that the change in velocity can take place without any delay.



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[1] Setting dynamics parameter 1
[2] Start movement with dynamics parameters 1
[3] Setting dynamics parameter 2
[4] Start movement with dynamics parameters 2

The dynamics parameters transmitted with this function block are not saved in non-volatile memory of the drive. They will stay active until the frequency inverter performs a "Reset."

Description

The MC_SetDynamics_MM function block alters the dynamics parameters *Velocity*, *Acceleration* and *Deceleration* during execution of a MC_MoveVelocitySensorless_MM function block.

The input signals *Velocity*, *Acceleration* and *Deceleration* determine the dynamic behavior of the rotation.

Input signals

The behavior of the MC_SetDynamics_MM function block depends on the following input signals:

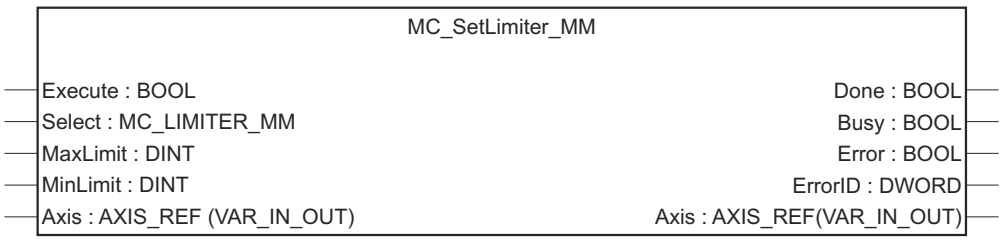
Input signal	Type	Meaning
Execute	BOOL	The *Execute* input signal starts the job of the function block. When a rising edge occurs at this input signal, the function block changes the dynamic parameters of the motor rotation according to the *Velocity*, *Acceleration* and *Deceleration* input signals.
Velocity	DINT	This input signal *Velocity* specifies the target setpoint speed of the motor axis rotation. (Unit: 1/ms, maximum setting range: -3000 ... 3000)
Acceleration	DINT	This input signal *Acceleration* specifies the ramp time for acceleration to a speed increased by 1500 1/min (increase of kinetic energy in the motor). (Unit: ms, maximum setting range: 100 ... 2000000)
Deceleration	DINT	This input signal *Deceleration* specifies the ramp time for deceleration to a speed decreased by 1500 1/min (decrease of kinetic energy in the motor). (Unit: ms, maximum setting range: 100 ... 2000000).
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

Output signals

The MC_SetDynamics_MM function block indicates the following output signals:

Output signal	Type	Meaning
Done	BOOL	The output signal *Done* indicates whether the motor axis rotates according to the new dynamic parameters *Velocity*, *Acceleration* and *Deceleration* . • *TRUE*: Motor axis rotates according to the new dynamic parameters. • *FALSE*: Parameter not yet written completely.
Busy	BOOL	The *Busy* output signal indicates whether the new dynamics parameters have been transmitted to the frequency inverter. • *TRUE*: New dynamic parameters are transmitted to the frequency inverter. • *FALSE*: No new dynamic parameters are transmitted to the frequency inverter.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred in the function block. • *FALSE*: No error has occurred in the function block.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").

4.9.4 Function block MC_SetLimiter_MM



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Description

The function block MC_SetLimiter_MM is used to transmit one of the following parameters from the MOVI-PLC® controller to the frequency inverter.

- *Minimum speed*
- *Maximum speed*
- *Maximum current limit*

Input signals

The behavior of the MC_SetLimiter_MM function block depends on the following input signals:

Input signal	Type	Meaning
Execute	BOOL	The *Execute* input signal starts the job of the function block. When a rising edge occurs at this input signal, the function block transfers the parameter specified by the *Select* input signal.
Select	MC_LIMITER_MM	The input signal *Select* specifies the parameters that the function block transmits from the MOVI-PLC® controller to the frequency inverter. • *VELOCITY*: The function block transfers the parameters *Minimum speed* and *Maximum speed*. (Unit: 1/min, maximum setting range 0 ... 3000) • *CURRENT*: The function block transmits the parameter *Maximum current limit*. (Unit: % I_N, maximum setting range 60 ... 160 %)
MaxLimit	DINT	The input signal *MaxLimit* specifies the transmitted parameter value. If the input signal *Select* is set to *VELOCITY*, this input signal determine the value for the parameter *Maximum speed*. (Unit and maximum setting range → Input signal *Select*)
MinLimit	DINT	The input signal *MinLimit* is used only if the input signal *Select* is set to *Velocity*. In this case, it specifies the value for parameter *Minimum speed*. (Unit and maximum setting range → Input signal *Select*)
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

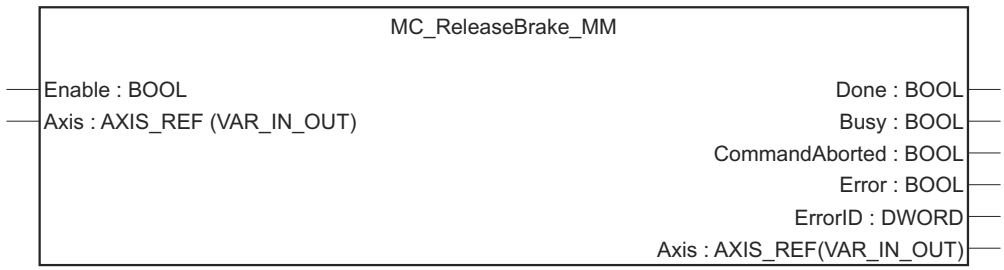
Output signals

The MC_SetLimiter_MM function block indicates the following output signals:

Output signal	Type	Meaning
Done	BOOL	The output signal *Done* indicates whether the parameter was transmitted successfully. • *TRUE*: The parameter was successfully transmitted by the MOVI-PLC® controller to the frequency inverter. • *FALSE*: Parameter not yet written completely.
Busy	BOOL	The output signal *Busy* indicates whether the parameter is currently being transmitted. • *TRUE*: The parameter is being transferred. • *FALSE*: The parameter is not being transmitted at present.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred during parameter transfer. • *FALSE*: No error has occurred.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").

4.10 Directory MM_Supplements

4.10.1 Function block MC_ReleaseBrake_MM



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You can set the MC_ReleaseBrake_MM function block during indexing. Indexing is a method by which the motor axis is positioned very precisely by means of external mechanical devices. The drive may not build up a counterforce or counter-torque because the motor axis will reach its final position through this external force.

Description

The MC_ReleaseBrake_MM function block releases a drive brake without enabling operation of the drive.

Input signals

The behavior of the MC_ReleaseBrake_MM function block depends on the following input signals:

Input signal	Type	Meaning
Execute	BOOL	The mechanical brake of the drive will open with a rising edge of the input signal *Execute*. The mechanical brake of the drive will close with a falling edge of the input signal *Execute*.
Axis	AXIS_REF	The input signal *Axis* specifies the motor axis on which the actions of the function block are to be executed.

Output signals

The MC_ReleaseBrake_MM function block indicates the following output signals:

Output signal	Type	Meaning
Done	BOOL	The output signal *Done* indicates if the process of releasing the drive brake has been concluded and if it has been completely released. • *TRUE*: The brake has been completely released. • *FALSE*: The brake has not been completely released.
Busy	BOOL	The output signal *Busy* indicates whether the drive brake is being released or has been released. • *TRUE*: The drive brake is being released or is released. • *FALSE*: The drive brake is applied.
Command Aborted	BOOL	This output signal *CommandAborted* shows whether the task of the function block has been cancelled. • *TRUE*: The task of the function block has been cancelled. • *FALSE*: The task of the function block has not been cancelled.
Error	BOOL	This output signal *Error* indicates whether an error has occurred in the function block. • *TRUE*: An error has occurred in the function block. • *FALSE*: No error has occurred in the function block.
ErrorID	DWORD	The output signal *ErrorID* indicates the error code of the error that has occurred (→ Sec. "Error identifier").

4.11 Error identifier

The following table displays the error codes, error desginations and a description of the errors that could occur at the *ErrorID* output of the function blocks.

The error codes "E_MDX..." also apply to the `MPLCMotion_MC07` and `MPLCMotion_MM` libraries.

Error code	Error designation	Error description
General IEC error code		
FA0001h	E_IEC_GENERAL_MAX_NUMBER_OF_AXIS	The maximum number of axes that can be connected has been exceeded.
FA0002h	E_IEC_GENERAL_INTERNAL_ERROR	Error during initialization of a MOVI-PLC® interface
FA0003h	E_IEC_GENERAL_COM_NOT_READY	The COM interface is not ready
FA0004h	E_IEC_GENERAL_INVALID_COM_NODE	The COM interface is not valid.
FA0005h	E_IEC_GENERAL_INVALID_COM_ADR	The COM address is not valid.
FA0006h	E_IEC_GENERAL_SIMULATION_NOT_AVAILABLE	Simulation mode not available for module.
FA0007h	E_IEC_GENERAL_INVERTER_NOT_REFERENCED	Module can be executed only if axis is referenced.
FA0008h	E_IEC_GENERAL_GENERAL_USE_OF_FB_NOT_ALLOWED	The current configuration does not permit use of this function block.
FA0009h	E_IEC_GENERAL_AXIS_DISCONNECTED	Execution of the function block was interrupted because the connection to the inverter broke down. Execute the function block at MC_CONNECT_AXIS_MDX.Done = TRUE once again.
FA0010h	E_IEC_GENERAL_WRONG_MOVI_PLC_FIRMWARE	The Motion library cannot be used with the MOVI-PLC® firmware.
FA0011h	E_IEC_GENERAL_SYNC_ALREADY_ESTABLISHED	The synchronization object has already been set up in the MOVI-PLC®.
FA0070h	E_IEC_PARAMETER_VALUE_OUT_OF_RANGE	Value for parameter access is outside the permitted range of values.
FA0071h	E_IEC_PARAMETER_INVALID_SELECTION	Invalid input selection on function block.
FA0072h	E_IEC_PARAMETER_INVALID_SERVICE	Invalid service
MPLCMotion_MDX error codes (also valid for `MPLCMotion_MC07` and `MPLCMotion_MM` libraries)		
FB0030h	E_MDX_CONNECTAXIS_NO_INVERTER_CONNECTED	No inverter detected at CAN bus. Check the CAN connection.
FB0031h	E_MDX_CONNECTAXIS_CAN_ID_ERROR	Required CAN ID is busy.
FB0032h	E_MDX_CONNECTAXIS_CYCLIC_COMMUNICATION	Cyclical communication between MOVI-PLC® controller and inverter has been interrupted.
FB0033h	E_MDX_CONNECTAXIS_IPOS_DOWNLOAD_ERROR	Error during IPOS® download.
FB0034h	E_MDX_CONNECTAXIS_WRONG_DEVICE_CONNECTED	An incorrect device has been connected. Check the control configuration.
FB0036h	E_MDX_CONNECTAXIS_WRONG_MDX_FIRMWARE_VERSION	Use of MPLCMotion_MDX library requires MOVIDRIVE® B with firmware status ≥ 16.
FB0060h	E_MDX_POWER_INVERTER_NOT_READY	The inverter is in "*24V operation*" or "*Safe stop*." Device cannot be switched on.
FB0061h	E_MDX_POWER_INVERTER_FAULT_STATE	Error on the inverter. Device cannot be switched on.
FB0070h	E_MDX_MOTIONBLOCK_INVALID_DATA_PROFIL	Motion function block cannot be executed from the current PLCopen state.
FB0071h	E_MDX_MOTIONBLOCK_LOG_ADR_NOT_INITIALIZED	Motion function block was called up before MC_ConnectAxis_MDX had generated a logical address (AXIS_REF).

Error code	Error designation	Error description
FB0072h	E_MDX_MOTIONBLOCK_INVALID_LOG_ADR	Motion function block was called up with an invalid logical address (AXISREF).
FB0073h	E_MDX_MOTIONBLOCK_INVALID_STATE	Motion function block cannot be executed from the current PLCopen state.
FB0074h	E_MDX_MOTIONBLOCK_INVALID_OPERATING_MODE	Motion function block cannot be executed in the operating mode set on the MOVIDRIVE® B inverter.
FB0075h	E_MDX_MOTIONBLOCK_INVALID_INVERTER_STATUS	Motion function block cannot be executed in the state currently active on the inverter.
FB0076h	E_MDX_MOTIONBLOCK_INVALID_VELOCITY	Speed setting is outside value range.
FB0090h	E_MDX_PARAMCHANNEL_SEND_BUFFER_OVERFLOW	Buffer for parameter channel is full.
FB0091h	E_MDX_PARAMCHANNEL_WRITEPARAMETER_BUSY	Trying to access parameter while the parameter channel is busy
FB0092h	E_MDX_PARAMCHANNEL_READPARAMETER_BUSY	Trying to access parameter while the parameter channel is busy
MC_ConnectAxis_MM error codes		
FB1000h	E_MM_CONNECTAXIS_MULTIBLE_COM_ADR	The same COM address was set on some MOVIMOT® inverters.
FB1001h	E_MM_CONNECTAXIS_INVALID_DATA_PROFILE	Motion function block cannot be executed with selected data profile.
FB1002h	E_MM_CONNECTAXIS_WRONG_INVERTER_TYPE	The connected device is not a MOVIMOT® MMC or an even more current MOVIMOT®.
FB1003h	E_MM_CONNECTAXIS_WRONG_SFCODE	An optional function has been set at the DIP switches of the MOVIMOT® inverter that is not necessary.
MC_Motion function block error codes		
FB1004h	E_MM_MOVEVELOCITY_INVERTER_NOT_READY	Inverter is in "*24V operation*" state. Device cannot be switched on.
FB1005h	E_MM_MOVEVELOCITY_CW_DISABLED	CW operation is blocked because CW/Stop terminal of inverter is not connected with 24V terminal.
FB1006h	E_MM_MOVEVELOCITY_CWW_DISABLED	CCW operation is blocked because CCW/Stop terminal of inverter is not connected with 24V terminal.
FB1007h	E_MM_RELEASEBRAKE_NOT_ENABLED	DIP switch S2/2 is set to OFF. The brake can be released without enable.
FB1008h	E_MM_RELEASEBRAKE_IMPOSSIBLE	MOVIMOT® inverter is in a state in which the brake cannot be released.
FB1009h	E_MM_MOTIONBLOCK_INVALID_LOGADR	Motion function block was called up with an invalid logical address (AXISREF).
FB100Ah	E_MM_MOTIONBLOCK_LOG_ADR_NOT_INITIALIZED	Motion function block was called up before MC_ConnectAxis_XXX had generated a logical address (AXIS_REF).
FB100Bh	E_MM_MOTIONBLOCK_INVALID_STATE	Motion function block cannot be executed from the current PLCopen state.
FB100Ch	E_MM_MOTIONBLOCK_RANGE_OVERFLOW	Value for parameter access is outside the permitted range of values.
MPLCUtilities error codes		
FC0001h	E_CAN_IO_MODULE_TIME_OUT_SBUS_INIT	Internal timeout during SBUS initialization.
FC0002h	E_CAN_IO_MODULE_TIME_OUT_WAGO_INIT	Timeout during initialization of the WAGO module.
FC0003h	E_CAN_IO_MODULE_NO_CONNECTION_DURING_INIT_SEQ	Termination of the connection to WAGO module during initialization.
FC0004h	E_CAN_IO_MODULE_WATCH_DOG_ERROR	Watchdog error. Communication to WAGO module interrupted.
FC0005h	E_CAN_IO_MODULE_ILLEGAL_CONFIGURATION	Incorrect configuration in the control configuration
FC0006h	E_CAN_IO_MODULE_CAN_ID_ERROR	CAN-ID is already in use.

Error code	Error designation	Error description
MPLCSystem error codes (extract)		
CC0070h	E_NO_MATCH_FOR_PARAMSET	No entry found in controller configuration for the axis.
F2000Ah	E_MVLINK_CAN	MOVILINK® error. Possible cause: Value outside the permitted range.
F20002h	E_MVLINK_RS485	MOVILINK® error. Possible cause: Value outside the permitted range.

5 Programming Examples

This section describes how to program a number of drive tasks using the function blocks described in this manual by means of specific examples.

Furthermore, this section introduces you to the basic functionality of the controller configuration, the library manager and the FUP Editor of the MOVITOOLS® MotionStudio software.

For more information, refer to the online help of the MOVITOOLS® MotionStudio software.

The following examples show the use of the MOVI-PLC® *basic* DHP11B controller. Programming of the MOVI-PLC® *basic* DHP11B controller and programming of MOVIFIT® in application version are basically identical.

5.1 Prerequisites for MOVITRAC® frequency inverter

To be able to test the created programs with a motor axis, the following prerequisites must be fulfilled:

- The MOVI-PLC® controller and a MOVITRAC® frequency inverter with connected motor are installed according to the instructions in the respective manuals.
- A system bus connection is installed correctly between the CAN -1 connection of the MOVI-PLC® controller and the CAN 1 connection of the MOVITRAC® frequency inverter according to the instructions in the respective manuals.
- The engineering PC is connected correctly to the MOVI-PLC® controller in accordance with the instructions in the relevant manuals. The interface of the engineering PC is configured correctly.
- You used the startup assistant to start the MOVITRAC® frequency inverter for control by a MOVI-PLC®controller.

5.2 Prerequisites for MOVIMOT® frequency inverters

To be able to test the created programs with a motor axis, the following prerequisites must be fulfilled:

- The MOVI-PLC® controller and a MOVIMOT® frequency inverter with connected motor are installed according to the instructions in the respective manuals.
- A serial connection between the COM-2 interface of the MOVI-PLC® controller (on the OST11B option card) and the RS485 connection of the MOVIMOT® frequency inverter has been installed correctly according to the instructions in the respective manuals.
- The engineering PC is connected correctly to the MOVI-PLC® controller in accordance with the instructions in the relevant manuals. The interface of the engineering PC is configured correctly.
- You used the startup assistant to start the MOVIMOT® frequency inverter for control by a MOVI-PLC® controller.

5.3 Prerequisites for MOVIFIT®

To be able to test the created programs with a motor axis, the following prerequisites must be fulfilled:

The engineering PC is connected correctly to the MOVIFIT® in accordance with the instructions in the relevant manuals. The interface of the engineering PC is configured correctly.

5.4 Jog mode of a motor axis without encoder with MOVITRAC®

Task description

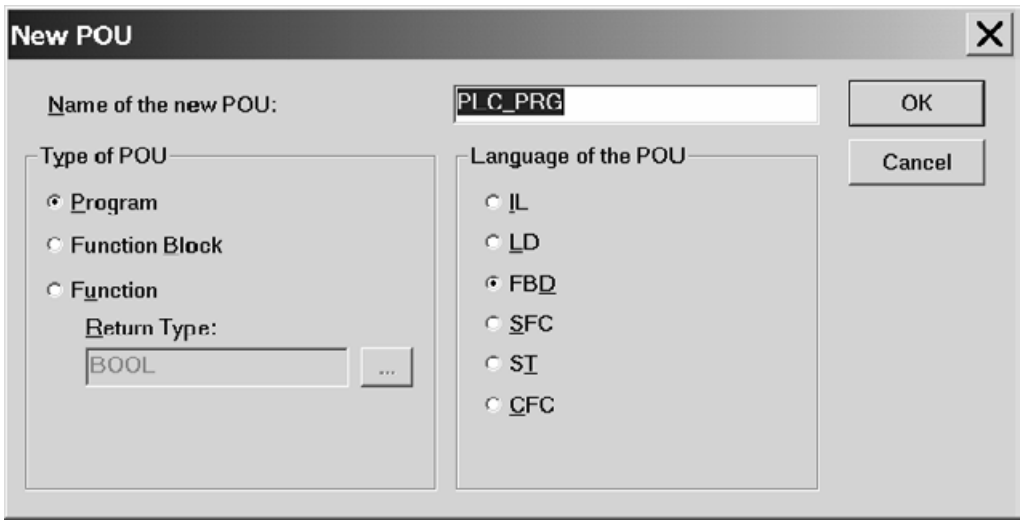
In this programming example, jog mode is to be performed with two motor axis speeds.

Two digital inputs of the MOVI-PLC® *basic* DHP11B controller are used for the *Jog Plus* and *Jog Minus* signals. The motor axis should turn in jog mode when 24V DC voltage is applied at one of the two digital inputs. Otherwise, the drive must be slowed. The speed of the motor axis should be able to be switched between two values using another digital input.

The drive is operated by using only the digital inputs. The MOVI-PLC® controller evaluates the input signals and controls the speed of the motor axis.

Step 1 **Create new project**

1. Switch on the engineering PC and the MOVI-PLC® controller[1)].
2. Start the PLC Editor of the MOVITOOLS® MotionStudio software in accordance with the instructions in the section "Starting MOVITOOLS® MotionStudio" in the MOVI-PLC® manual.
3. Create a new project. To do so, choose [File] / [NEW].
4. Select the configuration of your MOVI-PLC® in the dialog [Target system settings], in this programming example [MOVIPLC basic DHP11B]. Click <OK>. The [New POU] window appears (→ following figure).



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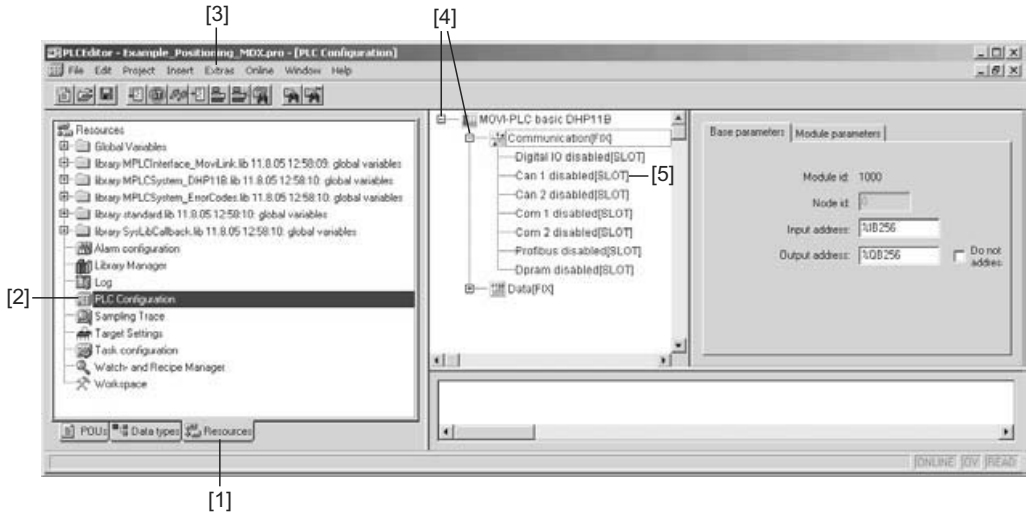
5. In this example, change the name of the "PLC_PRG" function block in the [New POU] window. After you start the program (→step 7 in this example), the MOVI-PLC® controller will execute the POU "PLC_PRG" automatically.
6. Select the option [Program] in the [Type of POU] group.
7. Select the option [FBD] in the [Language of the POU] group. Click <OK> to confirm your entry.
8. Save the project. To do so, select the menu item [File] / [Save] and enter a project name. Save the project regularly once you have made a number of changes and once you have finished creating the program.

1) The MOVI-PLC® controller must be powered as your version requires, or the drive inverter that the hardware of the MOVI-PLC® controller is plugged into must be switched on.

Step 2

Setting the controller configuration

Set the controller configuration as required to be able to use the interfaces of the MOVI-PLC® controller to connect peripheral equipment and to enable communication with other devices, e.g. inverters, I/O modules or a master controller.



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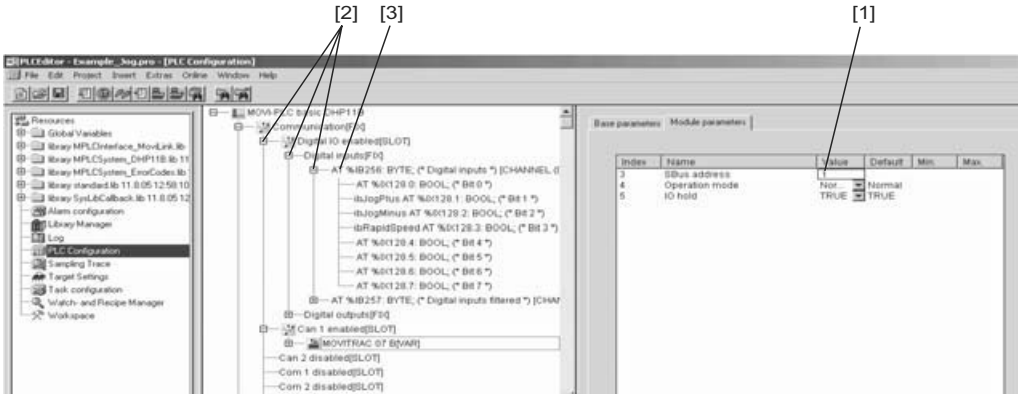
1. Select the [Resources] [1] tab page.
2. Use double-click to activate [PLC configuration] [2].
3. From the [Extras] menu, select menu item [Standard configuration] [3]. This is the setting for the controller configuration. You will be prompted to state if you want to replace the current configuration and replace it with the standard configuration. Click <Yes>.
4. Open the configuration tree. Click on the [+] symbol in front of the [MOVI-PLC basic DHP11B] and [Communication] [4].
5. Activate the CAN-1 interface of the MOVI-PLC® controller. Use the right mouse button to click the element [Can 1 disabled] [5]. In the context menu select [Replace element] / [Can 1 enabled].
6. Configure the MOVITRAC® B frequency inverter at the CAN-1 interface. Use the right mouse button to click the element [Can 1 enabled]. In the context menu select the items [Attach subelement] and [MOVITRAC 07].



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7. Select the element [MOVITRAC 07 B] and in the [Module parameters] tab page, enter the SBus address [1] that you selected when you started the frequency inverter.
8. Activate the digital inputs of the MOVI-PLC® controller. Use the right mouse button to click the element [Digital IO disabled]. In the context menu select [Replace element] / [Digital IO enabled].
9. In the control program, you can use the inputs and outputs by specifying the address details directly using the syntax "%I" / "%Q."

   However, it is easier to use symbolic identifiers as follows:

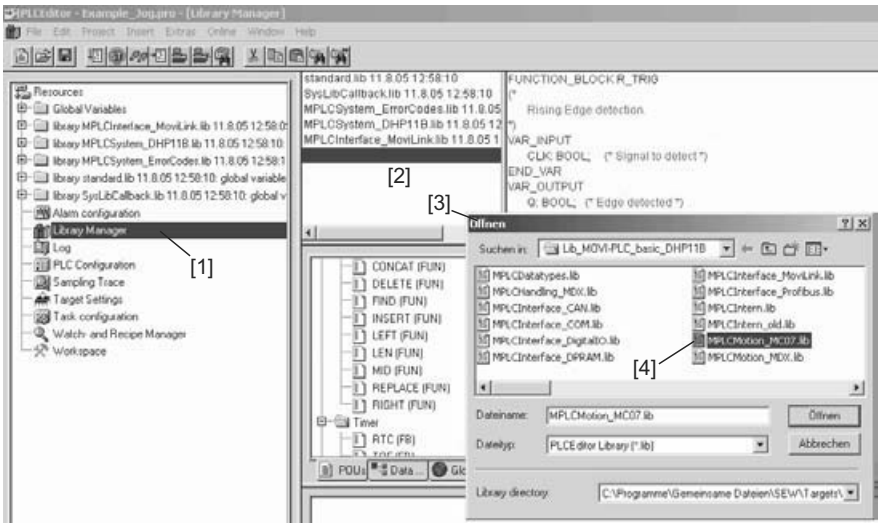
   Click on the [+] symbol in front of [Digital IO enabled], [Digital Inputs] and [AT%IB256: BYTE] [2].

   Click the first field [AT] in the configuration tree [3]. Enter the required name. In this example, these are the symbolic identifiers [DI_PLC] for the digital inputs of the MOVI-PLC® *basic* DHP11B controller and the symbolic identifiers [ibJogPlus], [ibJogMinus] und [ibRapidSpeed] for the individual inputs/outputs as shown in the illustration above.

Step 3

Integrate libraries

To use the function blocks of the `MPLCMotion_MC07.lib` library, add the library [`MPLCMotion_MC07.lib`] to the existing libraries as follows.



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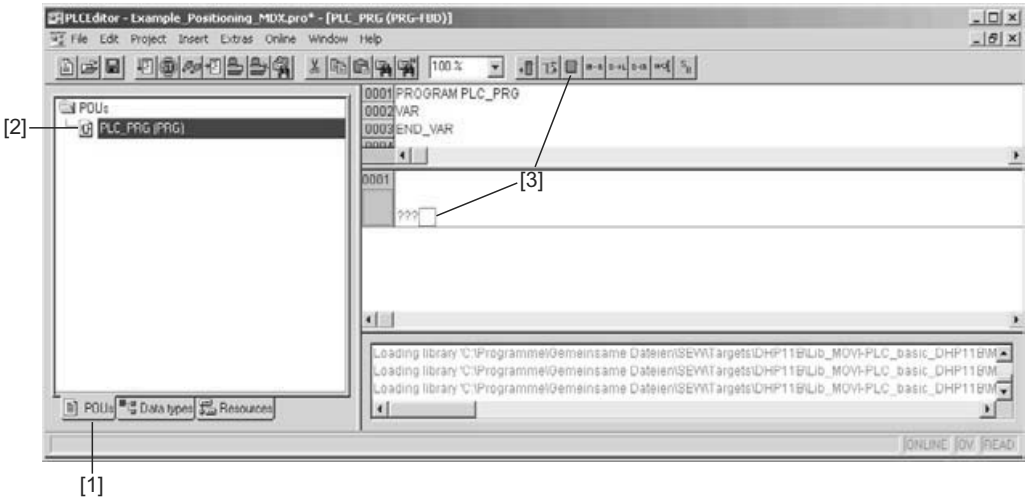
1. Use double-click to activate the [Library Manager] [1].
2. Use the right mouse button to click the library field [2]. Select the menu item [Additional library]. It opens a window for library selection [3].
3. Select the library `MPLCMotion_MC07.lib` and click the <Open> button. The selected library will be displayed in library field [2].

Step 4

Programming communication with the motor axis

To establish and execute communication between the MOVI-PLC® controller and the frequency inverter, add an instance of the *MC_ConnectAxis_MC07* function block as follows.



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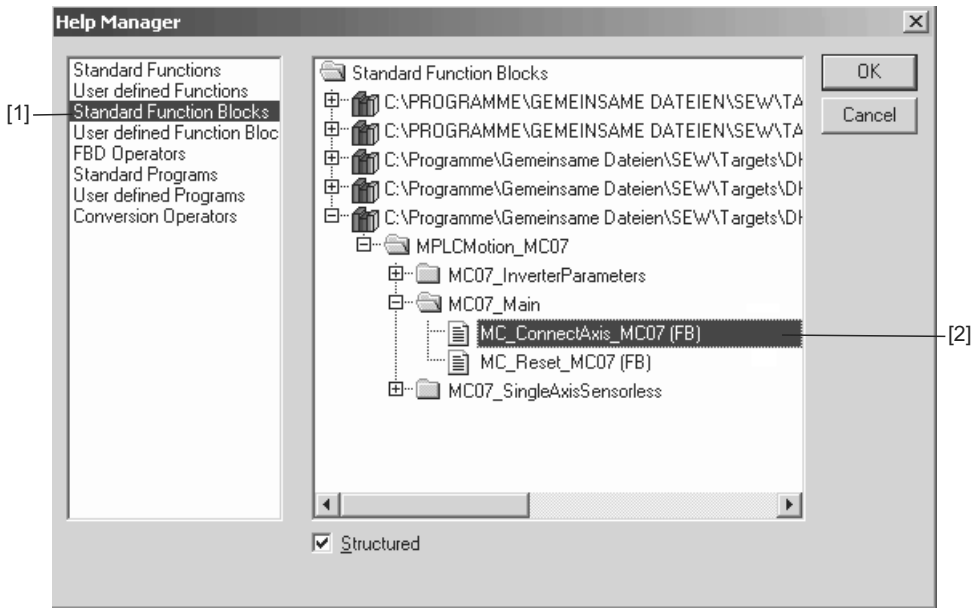
1. Select the [POUs] [1] tab page.
2. Open the editor of the [PLC_PRG(PRG)] POU by double-clicking the entry [2].
3. Add a new function block. To do so, first click on the box next to the question marks [???] and then on the symbol [ ] [3].
4. Mark the text "AND" in the function block you have just added.

5. Press the <F2> button. The [Help Manager] window (→ figure below) will open.



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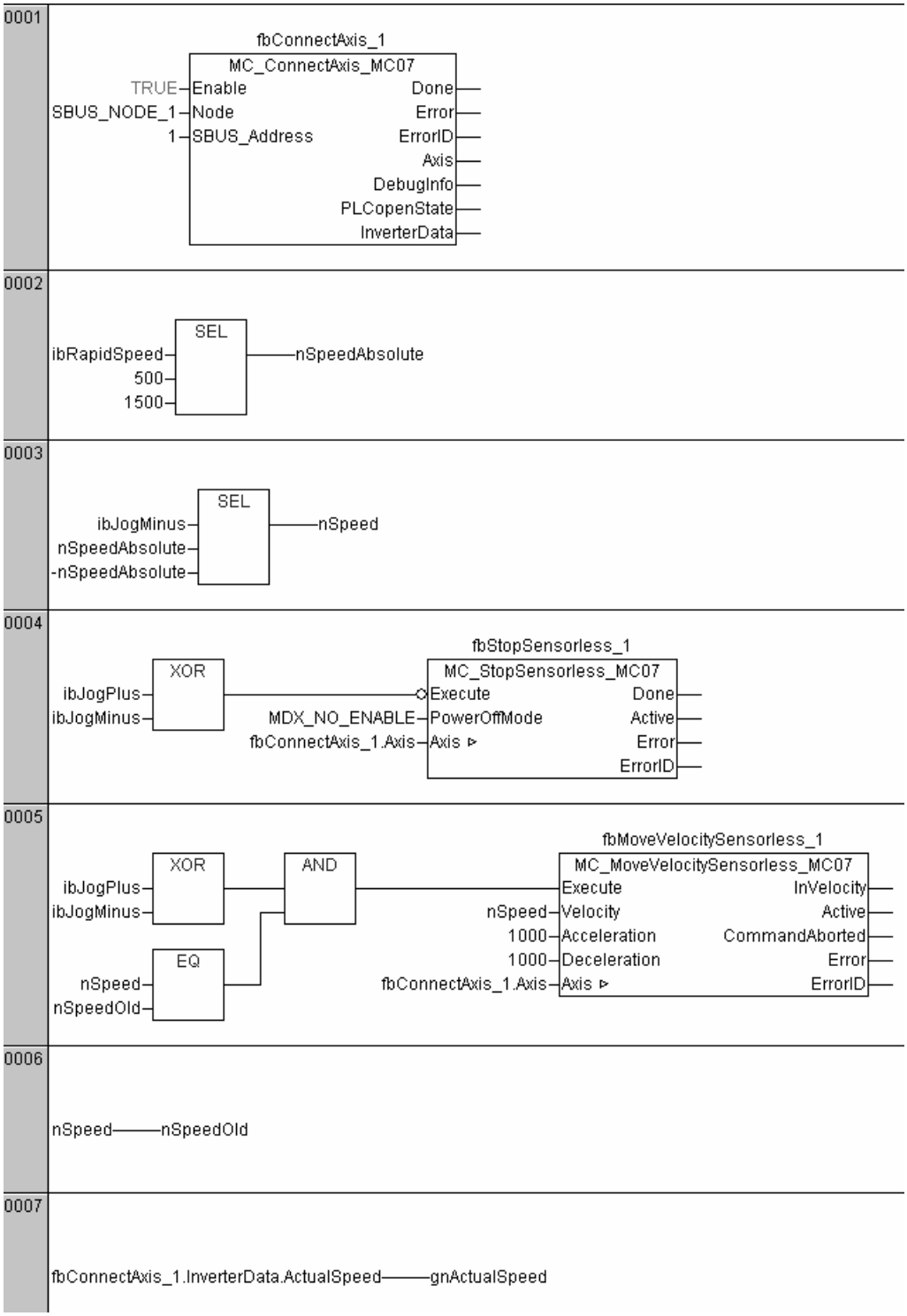
6. In the Help Manager, select the entry [Standard Function Blocks] [1] on the left.
7. In the panel to the right of the Help Manager, select function block *MC_ConnectAxis_MC07 (FB)* [2] from the `MC07_Main` directory of the `MPLCMotion_MC07` library. Confirm selection with <OK>.
8. Click on the added function block *MC_ConnectAxis_MC07* and then on the question marks "???" above the function block.
9. Enter the instance name (e.g. "fbConnectAxis_1") of the function block and press the <ENTER> key. Confirm the dialog [Variable declaration] with <OK>.
10. Enter the values listed in the table below for the input signals of the function block. To do so, click on the question marks "???" left of the input signal, enter the values and press <ENTER>:

Enable	*TRUE*
Node	Bus nodes that were set in the control configuration (*SBUS_NODE_1*, *SBUS_NODE_2* or *SBUS_NODE_3*)
SBUS_Address	SBUS 1 address that was set during startup of the frequency inverter (= SBus address used in the control configuration).

Step 5 **Programming jog mode**



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Create the program shown in the diagram in accordance with the procedure described in step 4.

1. Use your right mouse button to click into a free space of the [0001] network and use the displayed context menu to select [Network (after)].

2. Add the functions "SEL" in the [0002] and [0003] networks.
3. In the new [0004] network, insert an MC_StopSensorless_MC07 function block and give it an instance name (e.g. "fbStopSensorless_1") as described in step 4. The MC_StopSensorless_MC07 function block is included in the `MC07_SingleAxisSensorless` directory of the `MPLCMotion_MC07` library under the [Standard Function Blocks] entry.
4. Click on the line in front of the *Execute* input signal of the fbstopSensorless_1 function block. Use the right mouse button to click on the line and select the menu item [POU] or click the symbol [ ].

   In the Help manager, select the FUP Operator XOR or enter XOR directly.
5. Click on the line in front of the *Execute* input signal of the fbstopSensorless_1 function block once again. Use the right mouse button to click on the line and select the menu item [Negation] or click the symbol [ ].
6. Use the same approach to add an MC_MoveVelocitySensorless_MC07 function block in the [0005] network and enter the following values at the inputs of the function block:

Velocity	*nSpeed*
Acceleration	*1000*
Deceleration	*1000*
Axis	*fbConnectAxis_1.Axis*

   Enter the modules XOR, AND and EQ (→ figure on preceding page) in the [0005] network.
7. Enter the networks [0006] and [0007]. Program the assignments as shown in the figure on the preceding page.
8. To compile the project, choose the menu item [Project] / [Compile All]. When the programming is error-free, the message window displays the message "0 Error(s), 0 Warnings(s)."

Step 6 **Transmit project to MOVI-PLC® controller**

Click on the menu item [Online] / [Communication parameters].

In the dialog box that appears, set the communication parameters in accordance with the communication channel to be used. You only have to perform this step once.

Click on the menu item [Online] / [Login].

In the dialog box that appears, choose <Yes> in response to the question whether you want to load a program.

Step 7 **Testing the program**

Execute the program by activating the digital inputs as required.

Warning:

Depending on the terminal assignment, the frequency inverter status and the control program, the motor axis can begin to move immediately after the MOVI-PLC® controller has been started. To prevent risk of injury, keep sufficient distance from all moving parts.

Turn on the MOVITRAC® frequency inverter, if it has not happened in step 1, to start MOVI-PLC® control.

Start the MOVI-PLC® controller. To do so, choose the menu item [Online] / [Start].

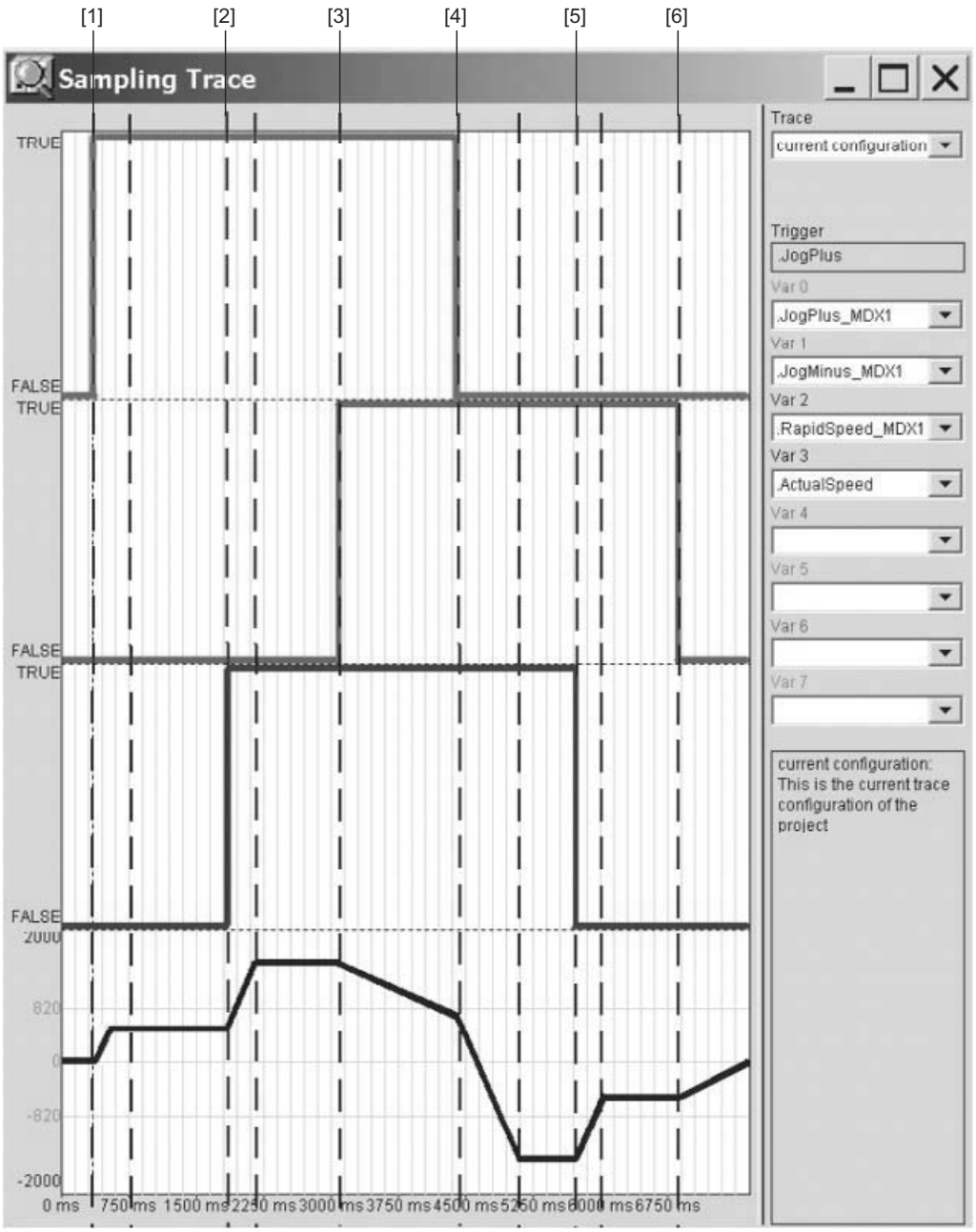
Start the jog mode of the motor axis. Apply the 24V DC voltage to one of the two inputs *DI02* or *DI03* of the frequency inverter.

Programming is correct when

- the motor axis rotates in positive direction (CW) with 24V DC voltage at input *DI02*
- the motor axis rotates in negative direction (CCW) with 24V DC voltage at input *DI03*
- the absolute value of the motor speed switches between 500 1/min and 1000 1/min when the voltage is switched between 0V and 24V DC at the *DI04* input.
- the motor axis is decelerated by applying the 24V DC voltage to both the inputs *DI02* and *DI03* or by removing the voltage from both.

For more details on the behavior of the MOVI-PLC® controller and the connected MOVITRAC® frequency inverter in this example, refer to the following section "Trace recording."

Trace recording



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When a rising edge occurs at the *lbJogPlus* signal, the motor axis starts speed control using the speed specified by the *lbRapidSpeed* signal [1].

When the *lbRapidSpeed* signal changes from *FALSE* to *TRUE*, the motor axis increases the speed to the higher of the two preset values [2].

If both signals *lbJogPlus*M and *lbJogMinus* are set to *TRUE* at the same time, the XOR operation, in conjunction with the negation in the controller program, causes a rising edge at the *Execute* input signal of the MC_StopSensorless_MC07 function block. The braking process is started [3].

For axes without encoders, a braking process triggered by a rising edge at the *Execute* input signal of the MC_StopSensorless_MC07 function block can be cancelled. The cancellation is executed when a speed-controlled movement is called up by a rising edge at the Execute input signal of the MC_MoveVelocitySensorless_MC07 function block. In this example, the required rising edge is generated by the XOR operation in the

[0005] network when the *lbJogPlus* signal is switched from *TRUE* to *FALSE*.

When the *lbRapidSpeed* signal switches from *TRUE* to *FALSE*, the motor axis is slowed to the lower of the two indicated speeds [5].

Resetting both signals *lbJogPlus* and *lbJogMinus* to *FALSE* starts the braking process in the same way as setting both signals to *TRUE* as described above [6].

5.5 Jog mode of a motor axis without encoder with MOVIMOT®

Task description

In the programming example, jog mode is to be implemented as in the example with the MOVITRAC® frequency inverter (→ page 62).

Programming

Unchanged steps

Program steps 1, 3, 4, 6 and 7 as described in the previous programming example "Jog mode of a motor axis without encoder using MOVITRAC."

In step 3 (→ page 66) add library `MPLCMotion_MM.lib` instead of library `MPLCMotion_MC07.lib`.

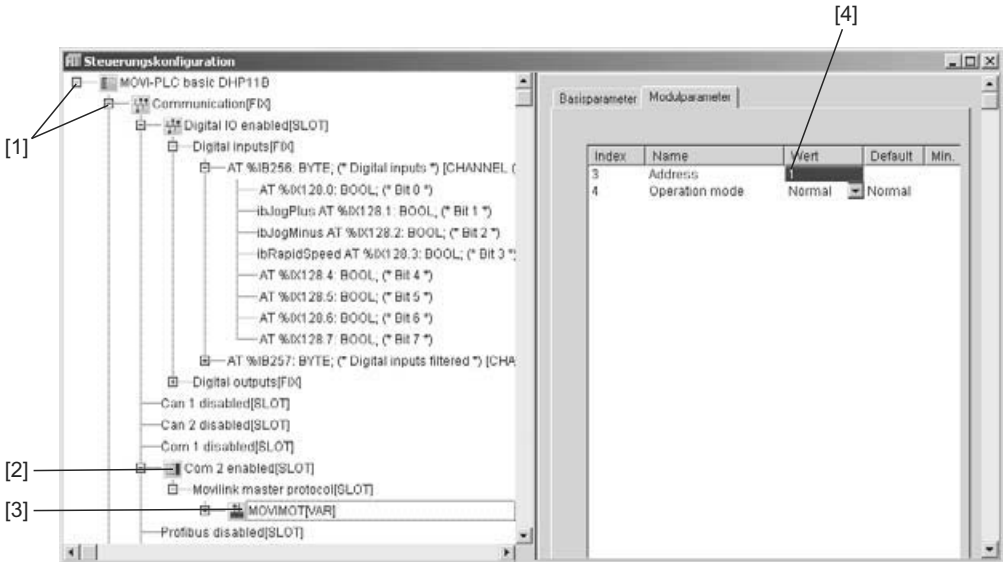
In step 4 (→ as of page 67) add function block MC_ConnectAxis_MM instead of function block MC_ConnectAxis_MC07.

Always add function blocks of type ..._MM instead of function blocks of tpye ..._MC07.

Note:

Trace recording of a motion sequence in the MOVIMOT® frequency inverter does **not** record the variable [ActualSpeed]. The MOVIMOT® inverter does not send the actual speed to the MOVI-PLC® controller.

Step 2 **Setting the controller configuration**



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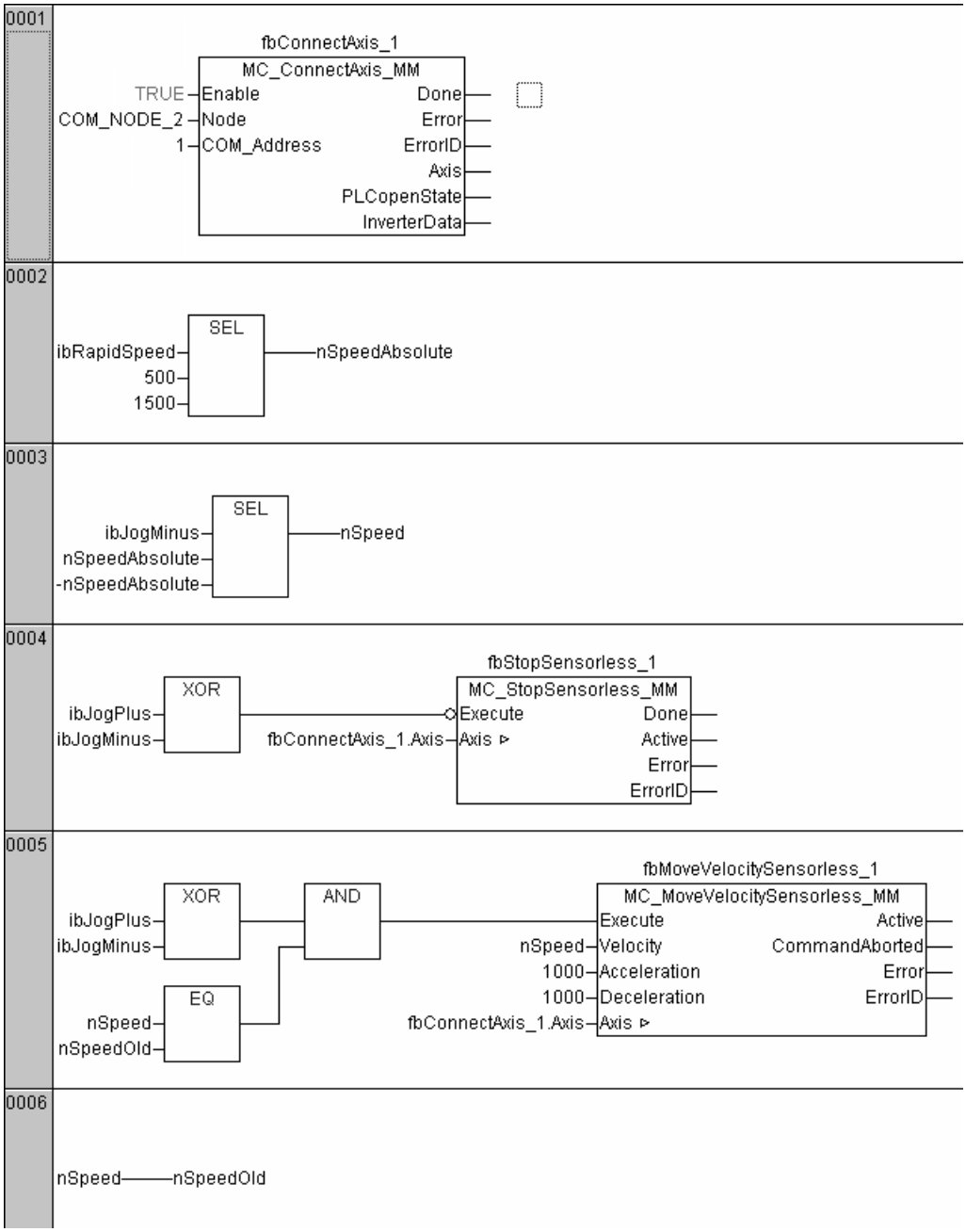
1. Select the tab [Resources].
2. Use double-click to activate [Controller configuration].
3. From the [Extras] menu, select menu item [Standard configuration]. This is the setting for the controller configuration. You will be prompted to state if you want to replace the current configuration and replace it with the standard configuration. Click <Yes>.
4. Open the configuration tree. Click on the [+] symbol in front of the [MOVI-PLC basic DHP11B] and [Communication] [1].
5. Activate the COM 2 interface of the MOVI-PLC® controller. Use the right mouse button to click the element [Com 2 disabled] [2]. In the context menu select [Replace element] / [Com 2 enabled].
6. Configure the MOVIMOT® at the COM 2 interface. To do so, use the right mouse button to click on the [+] symbol in front of [Com 2 enabled] and then on the element [Movilink master protocol]. In the context menu select [Add subelement] and [MOVIMOT] [3].
7. Select the element [MOVIMOT]. In the [Module parameter] window select the address of the serial interface/RS485 address set during startup of the frequency inverter [4].
8. Assign the symbol identifiers in the control configuration to the digital inputs as described in step 2, item 9 (→ page 65).

Step 5 **Programming jog mode**



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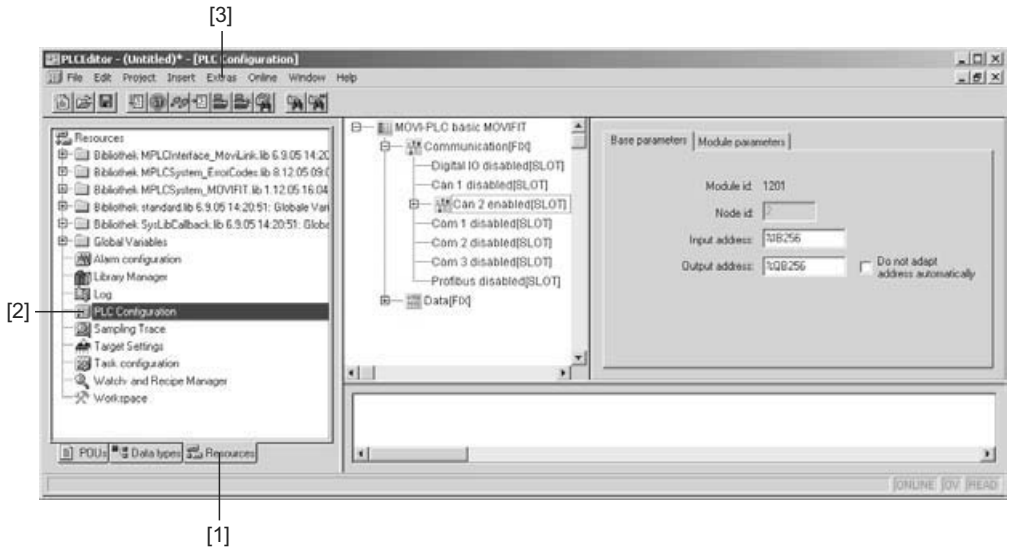
Create the program shown in the diagram in accordance with the procedure described in the previous programming example.

The associated trace recording of the MOVIMOT® frequency inverter corresponds to the trace recording of the MOVITRAC® frequency inverter. For additional information, see "Trace recording," page 72.

5.6 Control with MOVIFIT® SC

Setting the controller configuration

Set the controller configuration as required to be able to use the interfaces of the MOVI-PLC® controller in MOVIFIT® SC to connect peripheral equipment and to enable communication with other devices, e.g. inverters or a master controller.



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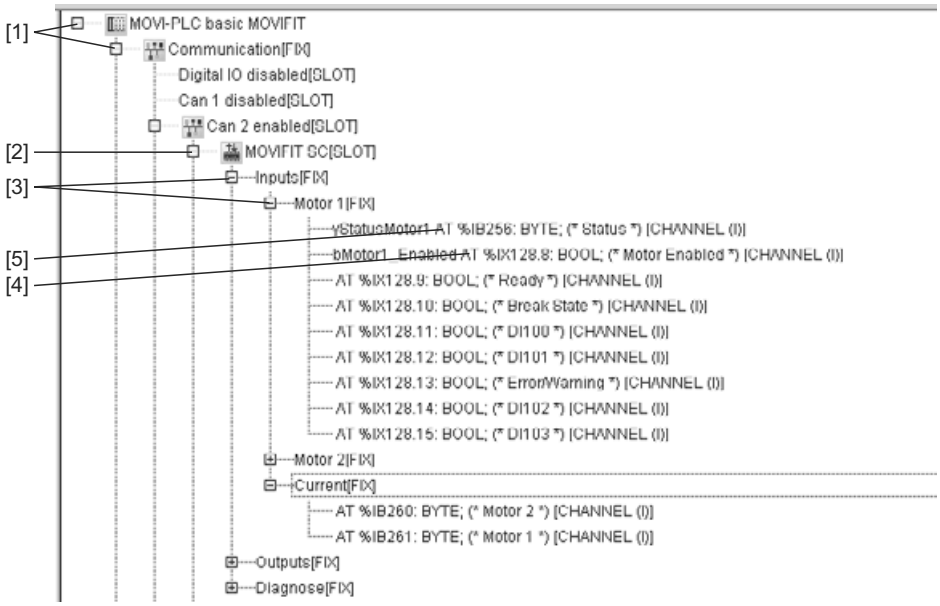
1. Select the [Resources] [1] tab.
2. Use double-click to activate [PLC Configuration] [2].
3. From the [Extras] menu, select menu item [Standard configuration]. This is the setting for the standard configuration [3]. You will be prompted to state if you want to replace the current configuration and replace it with the standard configuration. Click <Yes>.


[1]
[2]
[3]
[5]
[4]
MOVI-PLC basic MOVIFIT
Communication[FIX]
Digital IO disabled[SLOT]
Can 1 disabled[SLOT]
Can 2 enabled[SLOT]
MOVIFIT SC[SLOT]
Inputs[FIX]
Motor 1[FIX]
yStatusMotor1 AT %IB256: BYTE; (* Status *) [CHANNEL (I)]
bMotor1_Enabled AT %IX128.8: BOOL; (* Motor Enabled *) [CHANNEL (I)]
AT %IX128.9: BOOL; (* Ready *) [CHANNEL (I)]
AT %IX128.10: BOOL; (* Break State *) [CHANNEL (I)]
AT %IX128.11: BOOL; (* DI100 *) [CHANNEL (I)]
AT %IX128.12: BOOL; (* DI101 *) [CHANNEL (I)]
AT %IX128.13: BOOL; (* Error/Warning *) [CHANNEL (I)]
AT %IX128.14: BOOL; (* DI102 *) [CHANNEL (I)]
AT %IX128.15: BOOL; (* DI103 *) [CHANNEL (I)]
Motor 2[FIX]
Current[FIX]
AT %IB260: BYTE; (* Motor 2 *) [CHANNEL (I)]
AT %IB261: BYTE; (* Motor 1 *) [CHANNEL (I)]
Outputs[FIX]
Diagnose[FIX]

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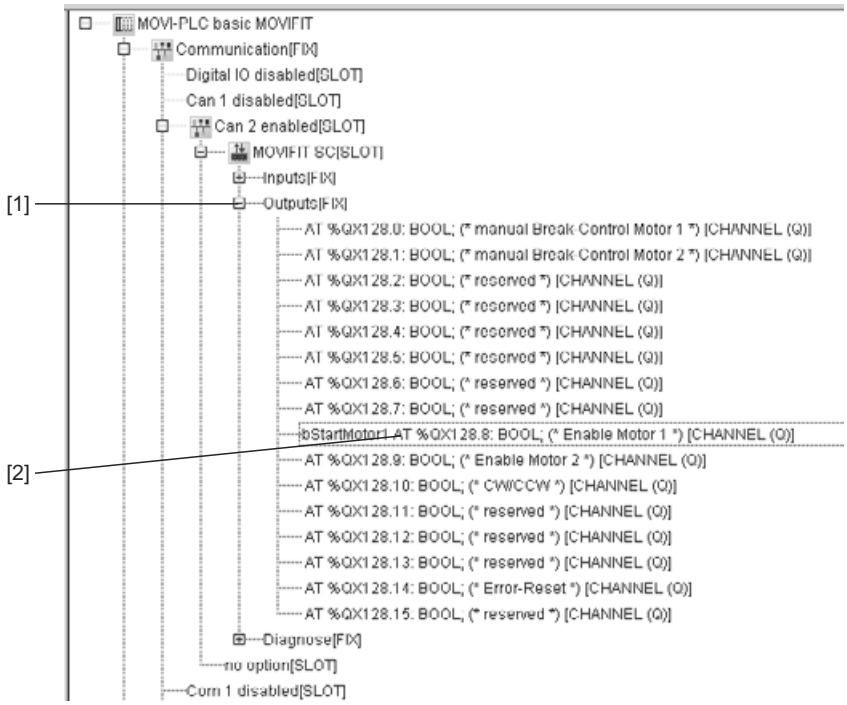
4. Open the configuration tree. Click on the [+] symbol in front of the [MOVI-PLC basic MOVIFIT] and [Communication] [1].
5. Click on the [+] symbol in front of [MOVIFIT SC] [2].

   You will now see a listing of the process data that are exchanged with the MOVIFIT® SC. Communication for this MOVIFIT® SC will be established automatically as soon as the program is running. You do not need an additional library. The libraries that are automatically added when you select the [MOVI-PLC basic MOVIFIT] target system include all necessary functions and function blocks.
6. Click on the [+] symbol in front of [Inputs] and [Motor 1] [3].
7. In the input bit 8, click on the field [AT] and enter the identifier [bMotor1_Enabled] [4]. The value of the variable *bMotor1_enabled* indicates if the motor has been enabled.
8. In the byte [Status], click on the field [AT] and enter the identifier [yStatusMotor1] [5]. The value of the variable *yStatusMotor1* indicates if the motor is rotating.

In general, the comment in parentheses describes the function of each bit or byte.


MOVI-PLC basic MOVIFIT
Communication[FIX]
Digital IO disabled[SLOT]
Can 1 disabled[SLOT]
Can 2 enabled[SLOT]
MOVIFIT SC[SLOT]
Inputs[FIX]
Outputs[FIX]
[1]
AT %QX128.0: BOOL; (* manual Break Control Motor 1 *) [CHANNEL (Q)]
AT %QX128.1: BOOL; (* manual Break Control Motor 2 *) [CHANNEL (Q)]
AT %QX128.2: BOOL; (* reserved *) [CHANNEL (Q)]
AT %QX128.3: BOOL; (* reserved *) [CHANNEL (Q)]
AT %QX128.4: BOOL; (* reserved *) [CHANNEL (Q)]
AT %QX128.5: BOOL; (* reserved *) [CHANNEL (Q)]
AT %QX128.6: BOOL; (* reserved *) [CHANNEL (Q)]
AT %QX128.7: BOOL; (* reserved *) [CHANNEL (Q)]
bStartMotor1 AT %QX128.8: BOOL; (* Enable Motor 1 *) [CHANNEL (Q)]
[2]
AT %QX128.9: BOOL; (* Enable Motor 2 *) [CHANNEL (Q)]
AT %QX128.10: BOOL; (* CW/CCW *) [CHANNEL (Q)]
AT %QX128.11: BOOL; (* reserved *) [CHANNEL (Q)]
AT %QX128.12: BOOL; (* reserved *) [CHANNEL (Q)]
AT %QX128.13: BOOL; (* reserved *) [CHANNEL (Q)]
AT %QX128.14: BOOL; (* Error-Reset *) [CHANNEL (Q)]
AT %QX128.15: BOOL; (* reserved *) [CHANNEL (Q)]
Diagnose[FIX]
no option[SLOT]
Com 1 disabled[SLOT]

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9. Click on the [+] symbol in front of [Outputs] [1].
10. In this program you control the motor by directly stating the identifier that you define just like you would the identifiers of the inputs.

Example:

Enter the identifier [bStartMotor1] in output bit 8 [2] . Motor 1 will now be enabled once the variable *bStartMotor1* is set to *1*.

The MOVI-PLC® controller in MOVIFIT® does not require a ConnectAxis function block as is the case with the MOVI-PLC® controller and other inverters. Control takes place with digital inputs and outputs.

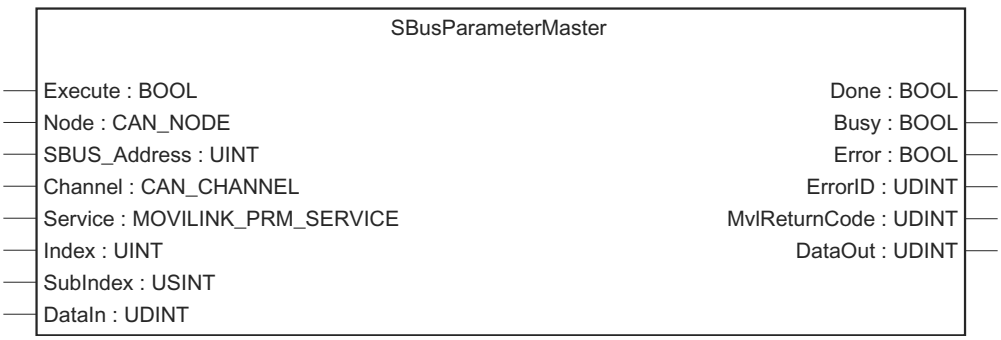
Read and write parameters from MOVIFIT® SC

You will find additional information on the meaning of the parameters of the MOVIFIT® SC power section in the "MOVIFIT® Technology" manual.

Use the SBusParameterMaster function block to read out parameters from MOVIFIT® SC or overwrite parameters of the MOVIFIT® SC in an IEC program.

The SBusParameterMaster function block is located in the `MPLCInterface_CAN.lib` library.

The following illustration shows the SBusParameterMaster function block.



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You will find additional information on:

- Creating a project
- Adding a library
- Testing a program

with MOVIFIT® SC in the "MOVI-PLC® Programming in PLC-Editor" system manual or in the programming examples described above.

The following table indicates in which libraries the types of the SBusParameterMaster function block are defined:

Input signal	Type	Value	Library
NODE	CAN_NODE	*2* (= *SBUS_NODE_2*)	`MPLCSystem_MOVIFIT.lib`
Channel	CAN_CHANNEL	*1* (= *SBUS_CHANNEL_1*)	`MPLCInterface_CAN.lib`
Service	MOVILINK_PRM_SERVICE	The most frequently used values are: *1* (= *ML_PRM_SVC_READ*) *2* (= *ML_PRM_SVC_WRITE*) *3* (= *ML_PRM_SVC_WRITE_VOLATILE*)	`MPLCInterface_Movilink.lib`

The internal unit, here MOVIFIT® SC, is always connected to the CAN2 branch and has unit address 1. For MOVIFIT® SC at the input *Channel* enter the value *SBUS_CHANNEL_1* or simply *1*.

Example: Set soft start ramp of motor 1 to 0.5 s.

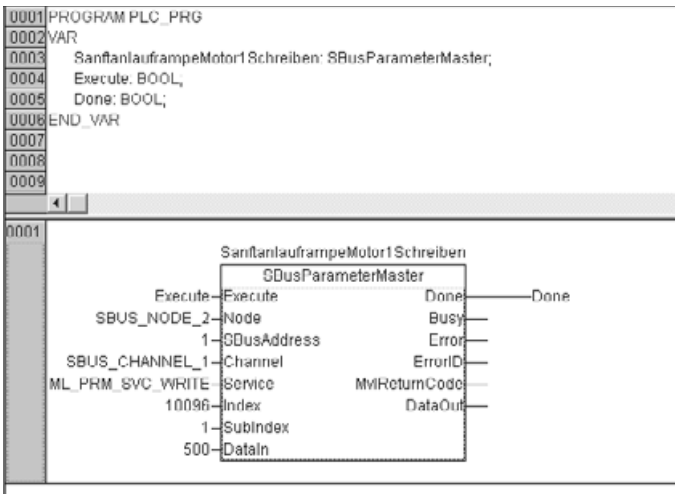
In this example, parameter "Soft start ramp motor 1" is to be set to 0.5 s:

The following table shows a section of the MOVIFIT® parameter table and includes the data required for programming.

Para-meter no.	Index no.	Parameter	Unit	EEPROM	read write	Comment
130	**10096.1**	**Soft start ramp motor 1**	0...**0.200**...1,000 [s]	Yes	r/w	Soft start ramp for motor 1. Parameter with EEPROM storage. Write access only when the motor and brake are not enabled in "Expert mode."

Solution:

Program the following program in the PLC-Editor:



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Result:

The write process is started with a rising edge at the *Execute* input signal.

If the *Done* output signal is set to *1*, the write process is concluded and the parameter "Soft start ramp motors 1" set to 0.5 s.

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Headquarters **Production** **Sales**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 • D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
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	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357
	Additional addresses for service in Germany provided on request!		

France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54, route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
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	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
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Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://sew-eurodrive.at sew@sew-eurodrive.at

Belgium			
Assembly **Sales** **Service**	**Brüssel**	SEW Caron-Vector S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be

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Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.reynolds@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Street LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25322611 gm-tianjin@sew-eurodrive.cn http://www.sew.com.cn

China			
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021 P. R. China	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew.com.cn
	Additional addresses for service in China provided on request!		

Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sewcol@sew-eurodrive.com.co

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@net.hr

Czech Republic			
Sales	**Praha**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Luná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 a220121236 Fax +420 220121237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Kopenhagen**	SEW-EURODRIVEA/S Geminivej 28-30, P.O. Box 100 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Mustamäe tee 24 EE-10620Tallin	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi

Gabon			
Sales	**Libreville**	Electro-Services B.P. 1889 Libreville	Tel. +241 7340-11 Fax +241 7340-12

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-Normanton, West- Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk

Greece			
Sales **Service**	**Athen**	Christ. Boznos & Son S.A. 12, Mavromichali Street P.O. Box 80136, GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 2 7960477 + 79604654 Fax +852 2 7959129 sew@sewhk.com

Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 office@sew-eurodrive.hu

India			
Assembly **Sales** **Service**	**Baroda**	SEW-EURODRIVE India Pvt. Ltd. Plot No. 4, Gidc Por Ramangamdi • Baroda - 391 243 Gujarat	Tel. +91 265 2831086 Fax +91 265 2831087 http://www.seweurodriveindia.com mdoffice@seweurodriveindia.com
Technical Offices	**Bangalore**	SEW-EURODRIVE India Private Limited 308, Prestige Centre Point 7, Edward Road Bangalore	Tel. +91 80 22266565 Fax +91 80 22266569 salesbang@seweurodriveinindia.com

Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458

Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 lirazhandasa@barak-online.net

Italy			
Assembly **Sales** **Service**	**Milano**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it

Ivory Coast			
Sales	**Abidjan**	SICA Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36

Japan			
Assembly **Sales** **Service**	**Toyoda-cho**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 sewjapan@sew-eurodrive.co.jp

Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate Unit 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master@sew-korea.co.kr

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 7139253 Fax +371 7139386 http://www.alas-kuul.com info@alas-kuul.com

Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 4947-86 +961 1 4982-72 +961 3 2745-39 Fax +961 1 4949-71 gacar@beirut.com

Lithuania			
Sales	**Alytus**	UAB Irseva Naujoji 19 LT-62175 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be

Macedonia			
Sales	**Skopje**	SGS-Skopje / Macedonia "Teodosij Sinactaski" 66 91000 Skopje / Macedonia	Tel. +389 2 385 466 Fax +389 2 384 390 sgs@mol.com.mk

Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my

Mexico			
Assembly **Sales** **Service**	**Queretaro**	SEW-EURODRIVE, Sales and Distribution, S. A. de C. V. Privada Tequisquiapan No. 102 Parque Ind. Queretaro C. P. 76220 Queretaro, Mexico	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx

Morocco			
Sales	**Casablanca**	Afit 5, rue Emir Abdelkader MA 20300 Casablanca	Tel. +212 22618372 Fax +212 22618351 richard.miekisiak@premium.net.ma

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 241-020 Fax +47 69 241-040 http://www.sew-eurodrive.no sew@sew-eurodrive.no

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Lodz	Tel. +48 42 67710-90 Fax +48 42 67710-99 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucuresti**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 849 47-70 Fax +221 849 47-71 senemeca@sentoo.sn

Serbia and Montenegro			
Sales	**Beograd**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor SCG-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 dipar@yubc.net

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybnicna 40 SK-83107 Bratislava	Tel. +421 2 49595201 Fax +421 2 49595200 http://www.sew.sk sew@sew-eurodrive.sk
	Zilina	SEW-Eurodrive SK s.r.o. ul. Vojtecha Spanyola 33 SK-010 01 Zilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-97411 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za dross@sew.co.za

South Africa			
	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 9 4431 84-70 Fax +34 9 4431 84-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442-00 Fax +46 36 3442-80 http://www.sew-eurodrive.se info@sew-eurodrive.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chon Buri**	SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuaroh Muang District Chon Buri 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.co.th

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 7, rue Ibn EI Heithem Z.I. SMMT 2014 Mégrine Erriadh	Tel. +216 1 4340-64 + 1 4320-29 Fax +216 1 4329-76

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 + 216 4419164 + 216 3838014 Fax +90 216 3055867 sew@sew-eurodrive.com.tr

Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

USA			
Production **Assembly** **Sales** **Service**	**Greenville**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manuf. +1 864 439-9948 Fax Ass. +1 864 439-0566 Telex 805 550 http://www.seweurodrive.com cslyman@seweurodrive.com

USA			
Assembly **Sales** **Service**	**San Francisco**	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 cshayward@seweurodrive.com
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve sewventas@cantv.net sewfinanzas@cantv.net

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